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(54) Title: HUMAN MICRORNAS AND METHODS FOR INHIBITING SAME

(57) Abstract: The invention relates to isolated DNA or RNA molecules comprising at least ten contiguous bases having a sequence in a microRNA shown in SEQ ID NOs: 1-94; 281-374; 467- 481 ; 497-522; or 549, except that up to thirty percent of the bases may be wobble bases, and up to 10% of the contiguous bases may be non-complementary. The invention further relates to modified single stranded microRNA molecules, isolated single stranded anti-microRNA molecules and isolated microRNP molecules. In another embodiment, the invention relates to a method for inhibiting microRNP activity in a cell.

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Human MicroRNAs and Methods for Inhibiting Same

This application asserts priority to U.S. Provisional Application Serial No. 60/714,519 filed on April 29, 2005, the specification of which is hereby incorporated by reference in its entirety.

The invention described in this application was made with funds from the National Institutes of Health/NIGMS, Grant Numbers 1 P01 GM073047-01 and 1 R01 GM068476-01. The United States government has certain rights in this invention.

BACKGROUND OF THE INVENTION

MicroRNAs are typically small RNA molecules of generally about nineteen to twenty-five nucleotides in length. These microRNAs are non-coding RNAs which are cleaved from hairpin precursors. Several microRNAs have been identified in the genomes of a wide range of multicellular life forms.

MicroRNAs in animals are found in diverse genomic locations. Typically, most microRNAs are encoded in intergenic regions. Other microRNAs are hosted within the introns of mRNAs or within non-coding RNA transcripts.

Many microRNAs are conserved in sequence between distantly related organisms, and exhibit tissue-specific or developmental stage-specific expression. The conservation of the sequence between organisms indicates that microRNAs may play important roles in biological processes.

MicroRNA molecules have been reported to control gene expression in a sequence specific manner in a wide variety of organisms by blocking translation after partially hybridizing to the non-coding 3' region of mRNAs of target genes. The genes targeted by microRNAs largely remain to be characterized.

However, there is growing evidence that microRNAs are implicated in various diseases and illnesses. For instance, Drosophila microRNAs have been shown to target genes involved in

apoptosis. Also, B-cell chronic lymphocytic leukemia has been linked to the deletion of two microRNAs.

Therefore, it is important to elucidate the mechanisms involved in mediating genes which play a role in the regulation of various diseases and illnesses. Thus, there is a need for materials and methods that can help elucidate the function of regulators, such as microRNAs, in various diseases and illnesses.

Further, due to the ability of microRNAs to induce RNA degradation or repress translation of mRNA which encode important proteins, there is also a need for novel molecules that inhibit microRNA-induced cleavage or promote expression by inhibiting translational repression of target mRNAs.

SUMMARY OF THE INVENTION

In one embodiment, the invention relates to an isolated DNA or RNA molecule comprising at least ten contiguous bases having a sequence in a microRNA shown in SEQ ID NOs:1-94, except that up to thirty percent of the bases may be wobble bases, and up to 10% of the contiguous bases may be non-complementary.

In another embodiment, the invention relates to a modified single stranded microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone units, each moiety comprising a base bonded to a backbone unit, wherein at least ten contiguous bases have the same sequence as a contiguous sequence of bases in a microRNA molecule shown in SEQ ID NOs:1-94, except that up to thirty percent of the bases pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof; no more than fifty percent of the contiguous moieties contain deoxyribonuleotide backbone units, and at least one moiety is not an unmodified deoxyribonucleotide moiety or an unmodified ribonucleotide moiety.

In a further embodiment, the invention relates to an isolated single stranded anti-microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone units, each moiety

comprising a base bonded to a backbone unit, each base forming a Watson-Crick base pair with a complementary base, wherein at least ten contiguous bases have a sequence complementary to a contiguous sequence of bases in any one of the microRNA molecules shown in SEQ ID NOs; 1-94, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof; no more than fifty percent of the contiguous moieties contain deoxyribonuleotide backbone units; and the molecule is capable of inhibiting microRNP activity.

In yet another embodiment, the invention relates to a method for inhibiting microRNP activity in a cell, the microRNP comprising a microRNA molecule, the method comprising introducing into the cell a single-stranded anti-microRNA molecule according to claim 18, wherein the anti-microRNA is complementary to the microRNA molecule.

In yet a further embodiment, the invention relates to an isolated microRNP comprising an isolated DNA or RNA molecule described herein.

In another embodiment, the invention relates to an isolated microRNP comprising an isolated single stranded microRNA molecule described herein.

In another embodiment, the invention relates to an isolated DNA or RNA molecule comprising at least ten contiguous bases having a sequence in a microRNA shown in SEQ. ID. NOs:281-374, except that up to thirty percent of the bases may be wobble bases, and up to 10% of the contiguous bases may be wobble bases, and up to 10% of the contiguous bases may be non-complementary.

In another embodiment, the invention relates to an isolated DNA or RNA molecule comprising at least ten contiguous bases having a sequence in a microRNA shown in SEQ. ID. NOs:467-481, except that up to thirty percent of the bases may be wobble bases, and up to 10% of the contiguous bases may be wobble bases, and up to 10% of the contiguous bases may be non-complementary.

In another embodiment, the invention relates to an isolated DNA or RNA molecule comprising at least ten contiguous bases having a sequence in a microRNA shown in SEQ. ID. NOs:497-522, except that up to thirty percent of the bases may be wobble bases, and up to 10%

of the contiguous bases may be wobble bases, and up to 10% of the contiguous bases may be non-complementary.

In another embodiment, the invention relates to an isolated DNA or RNA molecule comprising at least ten contiguous bases having a sequence in a microRNA shown in SEQ. ID. NO:549, except that up to thirty percent of the bases may be wobble bases, and up to 10% of the contiguous bases may be wobble bases, and up to 10% of the contiguous bases may be non-complementary.

In another embodiment, the invention relates to a modified single stranded microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone unites, each moiety comprising a base bonded to a backbone unit, wherein at least ten contiguous bases have the same sequence as a contiguous sequence of bases in a microRNA molecule shown in SEQ. ID. NOs: 281-374, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof; no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units, and at least one moiety is not an unmodified deoxyribonucleotide moiety or an unmodified ribonucleotide moiety.

In another embodiment, the invention relates to a modified single stranded microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone unites, each moiety comprising a base bonded to a backbone unit, wherein at least ten contiguous bases have the same sequence as a contiguous sequence of bases in a microRNA molecule shown in SEQ. ID. NOs:467-481, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof; no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units, and at least one moiety is not an unmodified deoxyribonucleotide moiety or an unmodified ribonucleotide moiety.

In another embodiment, the invention relates to a modified single stranded microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a

molecular backbone, the molecular backbone comprising backbone unites, each moiety comprising a base bonded to a backbone unit, wherein at least ten contiguous bases have the same sequence as a contiguous sequence of bases in a microRNA molecule shown in SEQ. ID. NOs: 497-522, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof; no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units, and at least one moiety is not an unmodified deoxyribonucleotide moiety or an unmodified ribonucleotide moiety.

In another embodiment, the invention relates to a modified single stranded microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone unites, each moiety comprising a base bonded to a backbone unit, wherein at least ten contiguous bases have the same sequence as a contiguous sequence of bases in a microRNA molecule shown in SEQ. ID. NO: 549, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof; no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units, and at least one moiety is not an unmodified deoxyribonucleotide moiety or an unmodified ribonucleotide moiety.

In another embodiment, the invention relates to an isolated single stranded anti-microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone units, each moiety comprising a base bonded to a backbone unit, each base forming a Watson-Crick base pair with a complementary base, wherein at least ten contiguous bases have a sequence complementary to a contiguous sequence of bases in any one of the microRNA molecules shown in SEQ ID NOs; 281-374, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof; no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units; and the molecule is capable of inhibiting microRNP activity.

In another embodiment, the invention relates to an isolated single stranded anti-microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone units, each moiety comprising a base bonded to a backbone unit, each base forming a Watson-Crick base pair with a complementary base, wherein at least ten contiguous bases have a sequence complementary to a contiguous sequence of bases in any one of the microRNA molecules shown in SEQ ID NOs; 467-481, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof; no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units; and the molecule is capable of inhibiting microRNP activity.

In another embodiment, the invention relates to an isolated single stranded anti-microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone units, each moiety comprising a base bonded to a backbone unit, each base forming a Watson-Crick base pair with a complementary base, wherein at least ten contiguous bases have a sequence complementary to a contiguous sequence of bases in any one of the microRNA molecules shown in SEQ ID NOs: 497-522, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof; no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units; and the molecule is capable of inhibiting microRNP activity.

In another embodiment, the invention relates to an isolated single stranded anti-microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone units, each moiety comprising a base bonded to a backbone unit, each base forming a Watson-Crick base pair with a complementary base, wherein at least ten contiguous bases have a sequence complementary to a contiguous sequence of bases in any one of the microRNA molecules shown in SEQ ID NO: 549, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof; no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units; and the molecule is capable of inhibiting microRNP activity.

DESCRIPTION OF THE FIGURES

Figure 1 shows the modified nucleotide units discussed in the specification. B denotes any one of the following nucleic acid bases: adenosine, cytidine, guanosine, thymine, or uridine

Figure 2: Conservation patterns of known and predicted human microRNAs. The conservation patterns are based on the UCSC phastCons scores (http://genome.ucsc.edu). The chromosomal regions of the microRNAs with additional 3000 flanking nucleotides on both sides are presented. The chromosomal coordinates follow the build 34 assembly (hg16) of the human genome from UCSC (http://genome.ucsc.edu/). For simplicity the X-axis displays the relative positions. Known microRNAs are designated by their Rfam name omitting the "hsa" prefix. The predicted microRNAs fall into two categories: verified predictions – these predictions were verified experimentally in this study. New predictions – these predictions have not been verified. The microRNA orientation is marked by an arrow. A: example of a microRNA prediction that extends a known pair cluster. B: Unraveling a new multi-member cluster. (The figures are not plotted to scale, and therefore the conserved region width is a function of the length of the presented region; the longer the region, the narrower is the presented profile).

DETAILED DESCRIPTION OF THE INVENTION

MicroRNA Molecules

In one embodiment, the invention relates to an isolated single stranded microRNA molecule having any one of SEQ.ID.NOs:1-94.

In another embodiment, the invention relates to an isolated single stranded microRNA molecule having any one of SEQ. ID. NOs: 281-374.

In yet another embodiment, the invention relates to an isolated single stranded microRNA molecule having any one of SEQ. ID. NOs: 467-481.

In a further embodiment, the invention relates to an isolated single stranded microRNA molecule having any one of SEQ. ID. NOs: 497-522.

In yet a further embodiment, the invention relates to an isolated single stranded microRNA molecule having any one of SEQ. ID. NO: 549

MicroRNA molecules are known in the art (see, for example, Bartel, *Cell,* 2004, 116, 281-297 for a review on microRNA molecules). The definitions and characterizations of microRNA molecules in the article by Bartel is hereby incorporated by reference. Such molecules are derived from genomic loci and are produced from specific microRNA genes.

Mature microRNA molecules are processed from precursor transcripts that form local hairpin structures. The hairpin structures are typically cleaved by an enzyme known as Dicer, generating thereby one microRNA duplex. See the above reference by Bartel.

Usually, one of the two strands of a microRNA duplex is packaged in a microRNA ribonucleoprotein complex (microRNP). A microRNP in, for example, humans, also includes the proteins eIF2C2/ Argonaute (Ago)2, the helicase Gemin3, and Gemin 4. Other members of the Argonaute protein family, such as Ago1, 3, and 4, also associate with microRNAs and form microRNPs.

In humans, microRNP containing Ago2 typically guide microRNA cleavage of a target RNA sequence. MicroRNP complexes containing other Ago proteins (e.g., Ago 1, 3, and 4) generally repress translation of target mRNAs.

In one embodiment, the invention relates to an isolated DNA or RNA molecule comprising at least ten contiguous bases having a sequence shown in SEQ ID NOs:1-94 in Table A, and equivalents thereof. Preferably, the isolated DNA or RNA molecule comprises at least thirteen, more preferably at least fifteen, and even more preferably at least twenty contiguous bases.

In another embodiment, the invention relates to an isolated DNA or RNA molecule comprising at least ten contiguous bases having a sequence shown in SEQ ID NOs:281-374 in Table A2, and equivalents thereof. Preferably, the isolated DNA or RNA molecule comprises at least thirteen, more preferably at least fifteen, and even more preferably at least twenty contiguous bases.

In yet another embodiment, the invention relates to an isolated DNA or RNA molecule comprising at least ten contiguous bases having a sequence shown in SEQ ID NOs:467-481 in Table A4, and equivalents thereof. Preferably, the isolated DNA or RNA molecule comprises at least thirteen, more preferably at least fifteen, and even more preferably at least twenty contiguous bases.

In a further embodiment, the invention relates to an isolated DNA or RNA molecule comprising at least ten contiguous bases having a sequence shown in SEQ ID NOs:497-522 in Table A6, and equivalents thereof. Preferably, the isolated DNA or RNA molecule comprises at least thirteen, more preferably at least fifteen, and even more preferably at least twenty contiguous bases.

In yet a further embodiment, the invention relates to an isolated DNA or RNA molecule comprising at least ten contiguous bases having a sequence shown in SEQ ID NO:549 in Table A8, and equivalents thereof. Preferably, the isolated DNA or RNA molecule comprises at least thirteen, more preferably at least fifteen, and even more preferably at least twenty contiguous bases.

Table A. MicroRNAs Sequences.

Name	Mature MicroRNA (5` → 3`)
miR-20b-5p	CAAAGUGCUCAUAGUGCAGGUAG (SEQ.ID.NO: 1)
miR-18b	UAAGGUGCAUCUAGUGCAGUUAG (SEQ.ID.NO: 2)
miR-843	CAACUAGACUGUGAGCUUCUAG (SEQ.ID.NO: 3)
miR-867	UCGAGGAGCUCACAGUCUAGAC (SEQ.ID.NO: 4)
miR-504	GUGCAUUGCUGUUGCAUUGC (SEQ.ID.NO: 5)
miR-720a	UGGCAGUGUAUUGUUAGCUGGU (SEQ.ID.NO: 6)
miR-720b	AGGCAGUGUAUUGUUAGCUGGC (SEQ.ID.NO: 7)
miR-92b	UAUUGCACUCGUCCCGGCCUCC (SEQ.ID.NO: 8)
miR-429	UAAUACUGUCUGGUAAAACCGU (SEQ.ID.NO: 9)
miR-822	GUGUGCGGAAAUGCUUCUGCUA (SEQ.ID.NO: 10)
miR-755#	AAAUCUCUGCAGGCAAAUGUGA (SEQ.ID.NO: 11)
miR-301b	CAGUGCAAUGAUAUUGUCAAAGCA (SEQ.ID.NO: 12)
miR-864	AAAAGCUGAGUUGAGAGGG SEQ.ID.NO: 13)
miR-374b	AUAUAAUACAACCUGCUAAGUG (SEQ.ID.NO: 14)
miR-619	UUUCCGGCUCGCGUGGGUGUGU (SEQ.ID.NO: 15)
miR-20b-3p	ACUGUAGUAUGGGCACUUCCAG (SEQ.ID.NO: 16)
miR-329	AACACACCUGGUUAACCUCUUU(SEQ.ID.NO: 17)
miR-421	AUCAACAGACAUUAAUUGGGCG (SEQ.ID.NO: 18)
miR-431	UGUCUUGCAGGCCGUCAUGCAG (SEQ.ID.NO: 19)
miR-433	AUCAUGAUGGGCUCCUCGGUGU (SEQ.ID.NO: 20)
miR-451	AAACCGUUACCAUUACUGAGUU (SEQ.ID.NO: 21)
miR-452	UGUUUGCAGAGGAAACUGAGAC (SEQ.ID.NO: 22)
miR-453	AGGUUGUCCGUGGUGAGUUCGC (SEQ.ID.NO: 23)
miR-500	UAGUGCAAUAUUGCUUAUAGGGU (SEQ.ID.NO: 24)
miR-604	UGCGGGGCUAGGGCUAACAGCA (SEQ.ID.NO: 25)

Name	Mature MicroRNA (5` → 3`)
miR-610	CAUGCCUUGAGUGUAGGACCGU (SEQ.ID.NO: 26)
miR-618	UUAAUAUGUACUGACAAAGCGU (SEQ.ID.NO: 27)
miR-620	AUGUUGGGAGCGGGCAGGUUGG (SEQ.ID.NO: 28)
miR-631#	UCCGAGCCUGGGUCUCCCUCUU (SEQ.ID.NO: 29)
miR-723-3p#	CGUGGGCCUGAUGUGGUGCUGG (SEQ.ID.NO: 30)
miR-723-5p#	AGUACCACGUGUCAGGGCCACA(SEQ.ID.NO: 31)
miR-730#	AAACAUUCGCGGUGCACUUCUU (SEQ.ID.NO: 32)
miR-732#	AAAGGAUUCUGCUGUCGGUCCC(SEQ.ID.NO: 33)
miR-800a	AAUCGUACAGGGUCAUCCACUU (SEQ.ID.NO: 34)
miR-800b	AAUCAUACAGGGACAUCCAGUU(SEQ.ID.NO: 35)
miR-803	UAUGUGCCUUUGGACUACAUCG (SEQ.ID.NO: 36)
miR-805	UUUUGCGAUGUGUUCCUAAUAU(SEQ.ID.NO: 37)
miR-814	GCAGGAACUUGUGAGUCUCC (SEQ.ID.NO: 38)
miR-815	AAUGGCGCCACUAGGGUUGUGC (SEQ.ID.NO: 39)
miR-816	UUGGGGAAACGGCCGCUGAGUG (SEQ.ID.NO: 40)
miR-817	CUGUAUGCCCUCACCGCUCAGC (SEQ.ID.NO: 41)
miR-818	AGGGGGAAAGUUCUAUAGUCCU (SEQ.ID.NO: 42)
miR-819	UCCAUUACACUACCCUGCCUCU (SEQ.ID.NO: 43)
miR-821	GCGGCGGCGGCGGAGGCUGCUG (SEQ.ID.NO: 44)
miR-892	CGGCGGCGGCGGCGGCGGCUGU (SEQ.ID.NO: 45)
miR-824	GGAGAAAUUAUCCUUGGUGUGU (SEQ.ID.NO: 46)
miR-825-3p	UUGUGACAGAUUGAUAACUGAA (SEQ.ID.NO: 47)
miR-825-5p	UCGGGGAUCAUCAUGUCACGAG (SEQ.ID.NO: 48)
miR-826	AUUGACACUUCUGUGAGUAGAG (SEQ.ID.NO: 49)
miR-828-5p	AUGCUGACAUAUUUACUAGAGG (SEQ.ID.NO: 50)
miR-828-3p	UCUAGUAAGAGUGGCAGUCGAA (SEQ.ID.NO: 51)
miR-829-5p	GAGCUUAUUCAUAAAAGUGCAG (SEQ.ID.NO: 52)
miR-829-3p	UAAUUUUAUGUAUAAGCUAGUC (SEQ.ID.NO: 53)

Name	Mature MicroRNA (5` → 3`)
miR-831	UGGGGCGGAGCUUCCGGAGGCC (SEQ.ID.NO: 54)
miR-832	CCAUGGAUCUCCAGGUGGGUCA (SEQ.ID.NO: 55)
miR-834	UGAAGGUCUACUGUGUGCCAGG (SEQ.ID.NO: 56)
miR-835-5p	AGGAAGCCCUGGAGGGGCUGGA (SEQ.ID.NO: 57)
miR-835-3p	UCCGGUUCUCAGGGCUCCACCU (SEQ.ID.NO: 58)
miR-837	ACCAGGAGGCUGAGGCCCCUCA (SEQ.ID.NO: 59)
miR-838	UCAGGCUCAGUCCCCUCCCGAU (SEQ.ID.NO: 60)
miR-839-5p	UCCUGUACUGAGCUGCCCCGA (SEQ.ID.NO: 61)
miR-839-3p	CGGGGCAGCUCAGUACAGGAU (SEQ.ID.NO: 62)
miR-840-5p	UCGACCGGACCUCGACCGGCU (SEQ.ID.NO: 63)
miR-840-3p	CUCGGCGUGGCGUCGGUCGUGG (SEQ.ID.NO: 64)
miR-841	UUUGAAAGGCUAUUUCUUGGUC (SEQ.ID.NO: 65)
miR-842	CGAAAACAGCAAUUACCUUUGC (SEQ.ID.NO: 66)
miR-845	AAAGCAUGCUCCAGUGGCGCA (SEQ.ID.NO: 67)
miR-846	CGGCUCUGGGUCUGUGGGGAGC (SEQ.ID.NO: 68)
miR-847	CAGAGAGGACCACUAUGGCGGG (SEQ.ID.NO: 69)
miR-848	AUUGCCAUCCCCUAUGGACCAG (SEQ.ID.NO: 70)
miR-849	UGUCUACUACUGGAGACACUGG (SEQ.ID.NO: 71)
miR-850	UUAGGGCCCUGGCUCCAUCUCC (SEQ.ID.NO: 72)
miR-851	GUGAACGGGCGCCAUCCCGAGG (SEQ.ID.NO: 73)
miR-852	UCAGCAAACAUUUAUUGUGUGC (SEQ.ID.NO: 74)
miR-853	UGGGAUCUCCGGGGUCUUGGUU (SEQ.ID.NO: 75)
miR-854	CUGCCCUGGCCCGAGGGACCGA (SEQ.ID.NO: 76)
miR-855-5p	UGAGUGUGUGUGUGUGAGUGUG (SEQ.ID.NO: 77)
miR-855-3p	CACGCUCAUGCACACACCCACA (SEQ.ID.NO: 78)
miR-857	AAGGCAGGGCCCCCGCUCCCCG (SEQ.ID.NO: 79)
miR-869	UGGUGGGCCGCAGAACAUGUGC (SEQ.ID.NO: 80)
miR-871-5p	CGGGUCGGAGUUAGCUCAAGCGG (SEQ.ID.NO: 81)

Name	Mature MicroRNA (5` → 3`)
miR-871-3p	CUAUCUGUCCAUCUCUGUGCUG (SEQ.ID.NO: 82)
miR-883	UGAAACAUACACGGGAAACCUC (SEQ.ID.NO: 83)
miR-884	AUUCUGCAUUUUUAGCAAGUUC (SEQ.ID.NO: 84)
miR-885	GCGACCCAUACUUGGUUUCAGA (SEQ.ID.NO: 85)
miR-886	AACAUCACAGCAAGUCUGUGCU (SEQ.ID.NO: 86)
miR-887-5p	UAUACCUCAGUUUUAUCAGGUG (SEQ.ID.NO: 87)
miR-887-3p	CCUGGAAACACUGAGGUUGUGU (SEQ.ID.NO: 88)
miR-888	AGACCCUGGUCUGCACUCUAUC (SEQ.ID.NO: 89)
miR-889	AGUGGGGAACCCUUCCAUGAGG (SEQ.ID.NO: 90)
miR-890	GUGUUGAAACAAUCUCUACUGA (SEQ.ID.NO: 91)
miR-891	AUGGAUUUCUUUGUGAAUCACC (SEQ.ID.NO: 92)
miR-893	AAGACGGGAGGAAAGAAGGGAA (SEQ.ID.NO: 93)
miR-894	GUGACAUCACAUAUACGGCAGC (SEQ.ID.NO: 94)

Table A1. MicroRNA Hairpin Precursor Sequences.

>hsa-mir-18b
CUUGUGUUAAGGUGCAUCUAGUGCAGUUAGUGAAGCAGCUUAGAAUCUACUGCC
CUAAAUGCCCCUUCUGGCACAGG (SEQ.ID.NO: 95)
>hsa-mir-20b
GAUAAGAUUGGGUCCUAGUAGUACCAAAGUGCUCAUAGUGCAGGUAGUUUUGGC
AUGACUCUACUGUAGUAUGGGCACUUCCAGUACUCUUGGAUAACAAAUCUCUUG
UUG (SEQ.ID.NO: 96)
>hsa-mir-301b
GGGGUCCCCCCUGCUGGCCGCAGGUGCUCUGACGAGGUUGCACUACUGUGCUCUG
AGAAGCAGUGCAAUGAUAUUGUCAAAGCAUCUGGGACCAGCCUUGGGGAUCUC
>hsa-mir-329-1 (SEQ.ID.NO: 97)
GGUACCUGAAGAGAGGUUUUCUGGGUUUCUGUUUCUUUAAUGAGGACGAAACAC
ACCUGGUUAACCUCUUUUCCAGUAUC (SEQ.ID.NO: 98)
>hsa-mir-329-2
GUGGUACCUGAAGAGAGGUUUUCUGGGUUUCUGUUUCUUUAUUGAGGACGAAAC
ACACCUGGUUAACCUCUUUUCCAGUAUCAA (SEQ.ID.NO: 99)
>hsa-mir-374b
ACUCGGAUGGAUAUAAUACAACCUGCUAAGUGUCCUAGCACUUAGCAGGUUGUA
UUAUCAUUGUCCGUGU (SEQ.ID.NO: 100)
>hsa-mir-421
CACAUUGUAGGCCUCAUUAAAUGUUUGUUGAAUGAAAAAAUGAAUCAUCAACAG
ACAUUAAUUGGGCGCCUGCUCUGUG (SEQ.ID.NO: 101)
>hsa-mir-500
CCAGAUCCUAGAACCCUAUCAAUAUUGUCUCUGCUGUGUAAAUAGUUCUGAGUA
GUGCAAUAUUGCUUAUAGGGUUUUGGUGUUUGG (SEQ.ID.NO: 102)
>hsa-mir-504
GGCGGCCCCGCGGUGCAUUGCUGUUGCAUUGCACGUGUGUGAGGCGGGUGCAGU
GCCUCGGCAGUGCAGCCCGGAGCCGGC (SEQ.ID.NO: 103)
>hsa-mir-604
GGGUUGGGCAAGGUGCGGGGCUAGGGCUAACAGCAGUCUUACUGAAGGUUUCCU
GGAAACCACGCACAUGCUGUUGCCAC (SEQ.ID.NO: 104)
>hsa-mir-610
CUCCAUGCCUUGAGUGUAGGACCGUUGGCAUCUUAAUUACCCUCCCACACCCAAG
GCUUGCA (SEQ.ID.NO: 105)
>hsa-mir-618
UUAUUGUGAAAUAUGUCAUUAAUAUGUACUGACAAAGCGUAUCUGUGUAAUAAA
UAUGCUUUUUGUCAGUACAUGUUAAUGGUAUAUUUCAUAACAA (SEQ.ID.NO: 106)
>hsa-mir-619
GCGGCUGCUGGACCCACCCGGCCGGGAAUAGUGCUCCUGGUUGUUUCCGGCUCGC
GUGGGUGUGUCGGCGGCGGG (SEQ.ID.NO: 107)
>hsa-mir-620
CGCCCCCACGUGGCCCCGCCCCCUGAGGCCGGCGCUGCCGCCAUGUUGGGAGCGG
GCAGGUUGGGAGCG (SEQ.ID.NO: 108)
>hsa-mir-631

GGGGCGGGAGGGGGGUCCCCGGUGCUCGGAUCUCGAGGGUGCUUAUUGUUCGGU CCGAGCCUGGGUCUCCCUCUUCCCCCC (SEQ.ID.NO: 109)

>hsa-mir-720A

UGCUCUGGAUACCUGUGUGUGAUGAGCUGGCAGUGUAUUGUUAGCUGGUUGAAU AUGUGAAUGGCAUCGGCUAACAUGCAACUGCUGUCUUAUUGCAUAUACAAUGAA CAUCAGAGUG (SEQ.ID.NO: 110)

>hsa-mir-720b

UGAAUCAGGUAGGCAGUGUAUUGUUAGCUGGCUGCUUGGGUCAAGUCAGCAGCC ACAACUACCCUGCCACUUGCUUCU (SEQ.ID.NO: 111)

>hsa-mir-723

GCCACCUUCCGAGCCUCCAGUACCACGUGUCAGGGCCACAUGAGCUGGGCCUCGU GGGCCUGAUGUGGUGCUGGGGCCUCAGGGGUCUG (SEQ.ID.NO: 112)

>hsa-mir-730

GCGGUACUUAAUGAGAAGUUGCCCGUGUUUUUUUCGCUUUAUUUGUGACGAAAC AUUCGCGGUGCACUUCUUUUUCAGUAUCCU (SEQ.ID.NO: 113)

>hsa-mir-732

CCAACGUCAGGGAAAGGAUUCUGCUGUCGGUCCCACUCCAAAGUUCACAGAAUGG GUGGUGGGCACAGAAUCUGGACUCU (SEQ.ID.NO: 114)

>hsa-mir-429

CGGCCGAUGGGCGUCUUACCAGACAUGGUUAGACCUGGCCCUCUGUCUAAUACUG UCUGGUAAAACCGUCCAUCCGCUG (SEQ.ID.NO: 115)

>hsa-mir-754

UGCUUCUGUGUGAUAUGUUUGAUAUUGGGUUGUUUAAUUAGGAACCAACUAAAU GUCAAACAUAUUCUUACAGCAGCA (SEQ.ID.NO: 116)

>hsa-mir-755

GCAGACUGGAAAAUCUCUGCAGGCAAAUGUGAUGUCACUGAGGAAAUCACACAC UUACCCGUAGAGAUUCUACAGUCUGA (SEQ.ID.NO: 117)

>hsa-mir-800A

CUUUCUUUUCCGUGCUAACCUUUGGUACUUGGAGAGUGGUUAUCCCUGUCCUGU UCGUUUUGCUCAUGUCGAAUCGUACAGGGUCAUCCACUUUUUCAGUAUCAAGAG CGC (SEQ.ID.NO: 118)

>hsa-mir-800b

UGAAGAGUGGUUAUCCCUGCUGUGUUCGCUUAAUUUAUGACGAAUCAUACAGGG ACAUCCAGUUUUUCA (SEQ.ID.NO: 119)

>hsa-mir-803

CCCUGGCGUGAGGGUAUGUGCCUUUGGACUACAUCGUGGAAGCCAGCACCAUGCA GUCCAUGGGCAUAUACACUUGCCUCAAGG (SEQ.ID.NO: 120)

>hsa-mir-805-2

GAUGCUAAACUAUUUUUGCGAUGUGUUCCUAAUAUGUAAUAUAAAUGUAUUGGG GACAUUUUGCAUUCAUAGUUUUGUAUC (SEQ.ID.NO: 121)

>hsa-mir-451

CUUGGGAAUGGCAAGGAAACCGUUACCAUUACUGAGUUUAGUAAUGGUAAUGGU UCUCUUGCUAUACCCAGA (SEQ.ID.NO: 122)

>hsa-mir-433

CCGGGGAGAAGUACGGUGAGCCUGUCAUUAUUCAGAGAGGCUAGAUCCUCUGUG UUGAGAAGGAUCAUGAUGGGCUCCUCGGUGUUCUCCAGG (SEQ.ID.NO: 123)

>hsa-mir-431
UCCUGCUUGUCCUGCGAGGUGUCUUGCAGGCCGUCAUGCAGGCCACACUGACGGU
AACGUUGCAGGUCGUCUUGCAGGGCUUCUCGCAAGACGACAUCCUCAUCACCAAC
GACG (SEQ.ID.NO: 124)
>hsa-mir-452
GCUAAGCACUUACAACUGUUUGCAGAGGAAACUGAGACUUUGUAACUAUGUCUC
AGUCUCAUCUGCAAAGAAGUAAGUGCUUUGC (SEQ.ID.NO: 125)
>hsa-mir-453
GCAGGAAUGCUGCGAGCAGUGCCACCUCAUGGUACUCGGAGGGAGGUUGUCCGU
GGUGAGUUCGCAUUAUUUAAUGAUGC (SEQ.ID.NO: 126)
>hsa-mir-814
GUGCAUUUGCAGGAACUUGUGAGUCUCCUAUUGAAAAUGAACAGGAGACUGAUG
AGUUCCCGGGAACAC (SEQ.ID.NO: 127)
>hsa-mir-815
CUAUGCACUGCACAACCCUAGGAGAGGGUGCCAUUCACAUAGACUAUAAUUGAA
UGGCGCCACUAGGGUUGUGCAGUGCACAA (SEQ.ID.NO: 128)
>hsa-mir-816
GGGUUUGGGGAAACGGCCGCUGAGUGAGGCGUCGGCUGUGUUUCUCACCGCGGU
CUUUUCCUCCCACUC (SEQ.ID.NO: 129)
>hsa-mir-817
CUUGGUGACGCUGUAUGCCCUCACCGCUCAGCCCCUGGGGCUGGCUUGGCAGACA
GUACAGCAUCCAGGGGAGUCAAGGGCAUGGGGCGAGACCAGA (SEQ.ID.NO: 130)
>hsa-mir-818-1
GGUAAGGGUAGAGGGAUGAGGGGGAAAGUUCUAUAGUCCUGUAAUUAGAUCUCA
GGACUAUAGAACUUUCCCCCUCAUCCCUCUGCCCUCUACC (SEQ.ID.NO: 131)
>hsa-mir-818-2
GUAGAGGGCAGAGGGAUGAGGGGGAAAGUUCUAUAGUCCUGAGAUCUAAUUACA
GGACUAUAGAACUUUCCCCCUCAUCCCUCUACCCUUACCA (SEQ.ID.NO: 132)
>hsa-mir-819
GGCCCGCACUCUCUCCAUUACACUACCCUGCCUCUUCUCCAUGAGAGGCAGCGGG
GUGUAGUGGAUAGAGCACGGGUU (SEQ.ID.NO: 133)
>hsa-mir-821-1
GCGGCGGCGGCGGAGGCUGCUGCUGGGGCGGCUGCUGCUGGGGCGGCUGCGGCGG
CGGCUGCUGCGGGGGCUGCUGCUGCUGUUGC (SEQ.ID.NO: 134)
>hsa-mir-821-2/-3
GCGGCUGCGGCGGCGGCGGAGGCUGCGGCGGCGACCGUGGCAGAGGCGGUGGCGG
AGGCCUCCGUGGCGGAGGCGGAAGC (SEQ.ID.NO: 135)
>hsa-mir-822
ACUCUAUAAAUCUAGUGGAAACAUUUCUGCACAAACUAGAUUCUGGACACCAGU
GUGCGGAAAUGCUUCUGCUACAUUUUUAGGGU (SEQ.ID.NO: 136)
>hsa-mir-824
GUUUCAUACUUGAGGAGAAAUUAUCCUUGGUGUGUUCGCUUUAUUUAUGAUGAA
UCAUACAAGGACAAUUUCUUUUUGAGUAUCAAAU (SEQ.ID.NO: 137)
>hsa-mir-825
UCUCAGACAUCUCGGGGAUCAUCAUGUCACGAGAUACCAGUGUGCACUUGUGACA
GAUUGAUAACUGAAAGGUCUGGGA (SEQ.ID.NO: 138)

>hsa-mir-826-2
UUGUCUGUGGUACCCUACUCUGGAGAGUGACAAUCAUGUAUAACUAAAUUUGAU
UGACACUUCUGUGAGUAGAGUAACGCAUGACAC (SEQ.ID.NO: 139)
>hsa-mir-826-3
UUGUCUGUGGUACCCUACUCUGGAGAGUGACAAUCAUGUAUAAUUAAAUUUGAU
UGACACUUCUGUGAGUAGAGUAACGCAUGACAC (SEQ.ID.NO: 140)
>hsa-mir-828
CUUCCUCAUGCUGACAUAUUUACUAGAGGGUAAAAUUAAUAACCUUCUAGUAAG
AGUGGCAGUCGAAGGGAAG (SEQ.ID.NO: 141)
>hsa-mir-829
CAGUCAGAAAUGAGCUUAUUCAUAAAAGUGCAGUAUGGUGAAGUCAAUCUGUAA
UUUUAUGUAUAAGCUAGUCUCUGAUUG (SEQ.ID.NO: 142)
>hsa-mir-831-1
GCUCCGCCCCACGUCGCAUGCGCCCCGGGAACGCGUGGGGCGGAGCUUCCGGAGG
CCCCGCUCUGCUGCCGACCCUGUGGAGCGGAGGGUGAAGCCUCCGGAUGCCAGUC
CCUCAUCGCUGGCCUGGUCGCGCUGUGGCGAAGGGGGCGGAGC (SEQ.ID.NO: 143)
>hsa-mir-831-2
GCUCCGCCCCACGUCGCAUGCGCCCCGGGAACGCGUGGGGCGGAGCUUCCGGAGG
CCCCGCCCUGCUGCCGACCCUGUGGAGCGGAGGGUGAAGCCUCCGGAUGCCAGUC
CCUCAUCGCUGGCCCGGUCGCGCUGUGGCGAAGGGGGCGGAGC (SEQ.ID.NO: 144)
>hsa-mir-831-3/-4/-5
CGCUCCGCCCCACGUCGCAUGCGCCCCGGGAAAGCGUGGGGCGGAGCUUCCGGAG
GCCCCGCCCUGCUGCCGACCCUGUGGAGCGGAGGGUGAAGCCUCCGGAUGCCAGU
CCCUCAUCGCUGGCCCGGUCGCGCUGUGGCGAAGGGGGCGGAGC (SEQ.ID.NO:
145)
>hsa-mir-832
AUUGUUCGACACCAUGGAUCUCCAGGUGGGUCAAGUUUAGAGAUGCACCAACCU
GGAGGACUCCAUGCUGUUGAGCUGU (SEQ.ID.NO: 146)
>hsa-mir-834
CAGGGCUUUGUACAUGGUAGGCUUUCAUUCAUUCGUUUGCACAUUCGGUGAAGG
UCUACUGUGUGCCAGGCCCUG (SEQ.ID.NO: 147)
>hsa-mir-835
CUGGCAGGCCAGGAAGAGGAGGAAGCCCUGGAGGGGCUGGAGGUGAUGGAUGUU
UUCCUCCGGUUCUCAGGGCUCCACCUCUUUCGGGCCGUAGAGCCAG (SEQ.ID.NO:
148)
>hsa-mir-837
AGAGGAGGGUCUCCUCGAGGGGUCUCUGCCUCUACCCAGGACUCUUUCAUGACCA
GGAGGCUGAGGCCCCUCACAGGCGGCUUCUUACUCU (SEQ.ID.NO: 149)
>hsa-mir-838
UCGUCAGGCUCAGUCCCCUCCCGAUAAACCCCUAAAUAGGGACUUUCCCGGGGGG
UGACCCUGGCUUUUUUGGCGA (SEQ.ID.NO: 150)
>hsa-mir-839
CUGACUCCCACCCCGAGUAUCCUGUACUGAGCUGCCCCGAGCUGGGCAGCAUGAA
GGGCCUCGGGGCAGCUCAGUACAGGAUGCCCCAGGGAGGAUGGAGAUCAG
(SEQ.ID.NO: 151)
>hsa-mir-839-2

CUCCAUCCUCCCUGGGGCAUCCUGUACUGAGCUGCCCCGAGGCCCUUCAUGCUGC CCAGCUCGGGGCAGCUCAGUACAGGAUACUCGGGGUGGGAGUCAG (SEQ.ID.NO: 152)
>hsa-mir-840
UUCAUCAAGACCCAGCUGAGUCACUGUCACUGCCUACCAAUCUCGACCGGACCUC GACCGGCUCGUCUGUGUUGCCAAUCGACUCGGCGUGGCGUCGGUCGUGGUAGAUA GGCGGUCAUGCAUACGAAUUUUCAGCUCUUGUUCUGGUGAC (SEQ.ID.NO: 153)
>hsa-mir-841
AGAAUCAUCUCUCCCAGAUAAUGGCACUCUCAAACAAGUUUCCAAAUUGUUUGA AAGGCUAUUUCUUGGUCAGAUGACUCU (SEQ.ID.NO: 154)
>hsa-mir-842
CCUAGAUAAGUUAUUAGGUGGGUGCAAAGGUAAUUGCAGUUUUUCCCAUUAUUU UAAUUGCGAAAACAGCAAUUACCUUUGCACCAACCUGAUGGAGUCCCCCU (SEQ.ID.NO: 155)
>hsa-mir-843
GCCCUCAAGGAGCUUACAAUCUAGCUGGGGGUAAAUGACUUGCACAUGAACACA ACUAGACUGUGAGCUUCUAGAGGGC (SEQ.ID.NO: 156)
>hsa-mir-845-1
CGCGAGGCCGGGGUCGAGCGCUUCAGUAGCUCAUGGCUCUGUAGAGUGCGCAUGG CCAAGCAAAGGAAAGCAUGCUCCAGUGGCGCA (SEQ.ID.NO: 157)
>hsa-mir-845-2
AGUAACCACUUAGUGUGUAUUGACUUGUCAGAAUUUUCAGAAUUUAAAGCAUGC UCCAGUGGCGCA (SEQ.ID.NO: 158)
>hsa-mir-846
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>hsa-mir-847
UUACUGUGUCAUUGUUGCUGUCAUUGCUACUGAGGAGUACUGACCAGAAUCAUC UGCAACUCUUAGUUGGCAGAGAGGACCACUAUGGCGGGUAG (SEQ.ID.NO: 160)
>hsa-mir-848
UGGGCCAGAUUGCCAUCCCCUAUGGACCAGAAGCCAAGGAUCUCUCUAGUGAUGG UCAGAGGGCCCAAAUGGCAGGGAUACCCA (SEQ.ID.NO: 161)
>hsa-mir-849
GCUUCUGUCUACUACUGGAGACACUGGUAGUAUAAAACCCAGAGUCUCCAGUAA UGGACGGGAGC (SEQ.ID.NO: 162)
>hsa-mir-850
CUGGGUUAGGGCCCUGGCUCCAUCUCCUUUAGGAAAACCUUCUGUGGGGAGUGG GGCUUCGACCCUAACCCAG (SEQ.ID.NO: 163)
>hsa-mir-851
GCAGAUCCUUGGGAGCCCUGUUAGACUCUGGAUUUUACACUUGGAGUGAACGGG CGCCAUCCCGAGGCUUUGC (SEQ.ID.NO: 164)
>hsa-mir-852
AGUAGGCCUCAGUAAAUGUUUAUUAGAUGAAUAAAUGAAUGACUCAUCAGCAAA CAUUUAUUGUGUGCCUGCU (SEQ.ID.NO: 165)
>hsa-mir-853

CCUGGGCUCUGACCUGAGACCUCUGGGUUCUGAGCUGUGAUGUUGCUCUCGAGCU GGGAUCUCCGGGGUCUUGGUUCAGGG (SEQ.ID.NO: 166)
>hsa-mir-854
GGUGUUAGCCCUGCGGCCCCACGCACCAGGGUAAGAGAGACUCUCGCUUCCUGCC CUGGCCCGAGGGACCGACUGGCUGGGCC (SEQ.ID.NO: 167)
>hsa-mir-855
UGGGUGCGGGCGUGUGAGUGUGUGUGUGUGAGUGUGUGUCGCUCCGGGUCCACG CUCAUGCACACACCCACACGCCCACACUCA (SEQ.ID.NO: 168)
>hsa-mir-855
UGGGUGCGGGCGUGUGAGUGUGUGUGUGUGAGUGUGUGUCGCUCCGGGUCCACG CUCAUGCACACACCCACACGCCCACACUCA (SEQ.ID.NO: 169)
>hsa-mir-857
GGGCCCGGCCCCAGGAGCGGGGCCUGGGCAGCCCCGUGUGUUGAGGAAGGAAGGC AGGGCCCCCGCUCCCCGGGCCU (SEQ.ID.NO: 170)
>hsa-mir-864
CCUUCUCUUCUCAGUUCUUCCCCAAGUUAGGAAAAGCUGAGUUGAGAGGG (SEQ.ID.NO: 171)
>hsa-mir-151
GUCUCUCUUCAGGGCUCCCGAGACACAGAAACAGACACCUGCCCUCGAGGAGCUC ACAGUCUAGAC (SEQ.ID.NO: 172)
>hsa-mir-869
AAAGAUGGUGGGCCGCAGAACAUGUGCUGAGUUCGUGCCAUAUGUCUGCUGACC AUCACCUUU (SEQ.ID.NO: 173)
>hsa-mir-871-1
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>hsa-mir-92b
CCGGGCCCCGGGCGGGCGGGAGGGACGGGACGCGGUGCAGUGUUGUUUUUUCCCC CGCCAAUAUUGCACUCGUCCCGGCCUCCGGCCCCCCCGGCCCCCCGG (SEQ.ID.NO: 175)
>hsa-mir-883
GAUACUCGAAGGAGAGGUUGUCCGUGUUGUCUUCUCUUUAUUUAUGAUGAAACA UACACGGGAAACCUCUUUUUUAGUAUC (SEQ.ID.NO: 176)
>hsa-mir-884
AUUUUCAUCACCUAGGGAUCUUGUUAAAAAGCAGAUUCUGAUUCAGGGACCAAG AUUCUGCAUUUUUAGCAAGUUCUCAAGUGAUGCUAAU (SEQ.ID.NO: 177)
>hsa-miR-885
GUGCUCUCCUGGCCCAUGAAAUCAAGCGUGGGUGAGACCUGGUGCAGAACGGGA AGGCGACCCAUACUUGGUUUCAGAGGCUGUGAGAAUAAC (SEQ.ID.NO: 178)
>hsa-mir-886
CCCCUGUGCCUUGGGCGGGCGGCUGUUAAGACUUGCAGUGAUGUUUAACUCCUCU CCACGUGAACAUCACAGCAAGUCUGUGCUGCUUCCCGUCCCUACGCUGCCUGGGC (SEQ.ID.NO: 179)
>hsa-mir-887

GUUUAGUGGUACUAUACCUCAGUUUUAUCAGGUGUUCUUAAAAUCACCUGGAAA
CACUGAGGUUGUGUCUCACUGAAC (SEQ.ID.NO: 180)
>hsa-mir-888
GCUGCUGUUGGGAGACCCUGGUCUGCACUCUAUCUGUAUUCUUACUGAAGGGAG
UGCAGGGCAGGGUUUCCCAUACAGAGGGC (SEQ.ID.NO: 181)
>hsa-mir-889
GGAAUUGACUUAGCUGGGUAGUGGGGAACCCUUCCAUGAGGAGUAGAACACUCC
UUAUGCAAGAUUCCCUUCUACCUGGCUGGGUUGGAGUC (SEQ.ID.NO: 182)
>hsa-mir-890
UCAUUCCUUCAGUGUUGAAACAAUCUCUACUGAACCAGCUUCAAACAAGUUCACU
GGAGUUUGUUUCAAUAUUGCAAGAAUGA (SEQ.ID.NO: 183)
>hsa-mir-891
CACAAACUGUGAAGUGCUGUGGAUUUCUUUGUGAAUCACCAUAUCUAAGCUAAU
GUGGUGGUGGUUUACAAAGUAAUUCAUAGUGCUUCACAGGUG (SEQ.ID.NO: 184)
>hsa-mir-892
GCGGCUGCGGCGGCGGCGGCGGCGGCGGCGGCGGCUGUUGCUGUUGCUGCUGCUG
CUGCUGCUGCUGUUGCUGCUGCUGCUGCUGCUGC (SEQ.ID.NO: 185)
>hsa-mir-893
GAGGGGGAAGACGGGAGGAAAGAAGGGAGUGGUUCCAUCACGCCUCCUCACUCC
UCUCCUCCCGUCUUCUCCUCUC (SEQ.ID.NO: 186)
>hsa-mir-894
CUACUGCUGUUGGUGGCAGCUUGGUGGUCGUAUGUGUGACGCCAUUUACUUGAA
CCUUUAGGAGUGACAUCACAUAUACGGCAGCUAAACUGCUACAUGGGACAACAA
UU (SEQ.ID.NO: 187)

Table A2. MicroRNA Sequences

Name	Mature MicroRNA (5`-> 3`)
hsa-miR-100516	UACUCAAAAAGCUGUCAGUCA (SEQ. ID. NO: 281)
hsa-miR-100604	UGCGGGGCUAGGGCUAACAGCA (SEQ. ID. NO: 282)
hsa-miR-100610-5p	CAUGCCUUGAGUGUAGGACCGU (SEQ. ID. NO: 283)
hsa-miR-100631	UCCGAGCCUGGGUCUCCCUCUU (SEQ. ID. NO: 284)
hsa-miR-100701	AAGGUUACUUGUUAGUUCAGG (SEQ. ID. NO: 285)
hsa-miR-100723	CGUGGGCCUGAUGUGGUGCUGG (SEQ. ID. NO: 286)
hsa-miR-100730	AAACAUUCGCGGUGCACUUCUU (SEQ. ID. NO: 287)
hsa-miR-100732	AAGGAUUCUGCUGUCGGUCCC (SEQ. ID. NO: 288)
hsa-miR-100754	UGAUAUGUUUGAUAUUGGGUU (SEQ. ID. NO: 289)
hsa-miR-100760	GCACUGAGAUGGGAGUGGUGUA (SEQ. ID. NO: 290)
hsa-miR-100814	GCAGGAACUUGUGAGUCUCCU (SEQ. ID. NO: 291)

Name	Mature MicroRNA (5`-> 3`)
hsa-miR-100815	AAUGGCGCCACUAGGGUUGUGU (SEQ. ID. NO: 292)
hsa-miR-100818	AGGGGGAAAGUUCUAUAGUCC (SEQ. ID. NO: 293)
hsa-miR-100819	UCCAUUACACUACCCUGCCUCU (SEQ. ID. NO: 294)
hsa-miR-100824	GGAGAAAUUAUCCUUGGUGUGU (SEQ. ID. NO: 295)
hsa-miR-100825-3p	UGUGACAGAUUGAUAACUGAAA (SEQ. ID. NO: 296)
hsa-miR-100825-5p	UCGGGGAUCAUCAUGUCACGAGA (SEQ. ID. NO: 297)
hsa-miR-100829-3p	UAAUUUUAUGUAUAAGCUAGU (SEQ. ID. NO: 298)
hsa-miR-100835-5p	AGGAAGCCCUGGAGGGGCUGGAG (SEQ. ID. NO: 299)
hsa-miR-100842	CGAAAACAGCAAUUACCUUUGC (SEQ. ID. NO: 300)
hsa-miR-100843-3p	CAACUAGACUGUGAGCUUCUAG (SEQ. ID. NO: 301)
hsa-miR-100843-5p	AAGGAGCUUACAAUCUAGCUGGG (SEQ. ID. NO: 302)
hsa-miR-100846	CGGCUCUGGGUCUGUGGGGAG (SEQ. ID. NO: 303)
hsa-miR-100851	GUGAACGGGCGCCAUCCCGAGG (SEQ. ID. NO: 304)
hsa-miR-100852	UCAGCAAACAUUUAUUGUGUGC (SEQ. ID. NO: 305)
hsa-miR-100854	CUGCCCUGGCCCGAGGGACCGA (SEQ. ID. NO: 306)
hsa-miR-100855-3p	CACGCUCAUGCACACACCCACA (SEQ. ID. NO: 307)
hsa-miR-100855-5p	UGAGUGUGUGUGUGUGAGUGUGU (SEQ. ID. NO: 308)
hsa-miR-100869-3p	UAUGUCUGCUGACCAUCACCUU (SEQ. ID. NO: 309)
hsa-miR-100869-5p	UGGUGGGCCGCAGAACAUGUGC (SEQ. ID. NO: 310)
hsa-miR-100871-3p	CGCGGGUGCUUACUGACCCUU (SEQ. ID. NO: 311)
hsa-miR-100871-5p	CGGGUCGGAGUUAGCUCAAGCGG (SEQ. ID. NO: 312)
hsa-miR-100885	GCGACCCAUACUUGGUUUCAG (SEQ. ID. NO: 313)
hsa-miR-100887-3p	CCUGGAAACACUGAGGUUGUGU (SEQ. ID. NO: 314)
hsa-miR-100887-5p	UAUACCUCAGUUUUAUCAGGUG (SEQ. ID. NO: 315)
hsa-miR-100891-3p	UGGUGGUUUACAAAGUAAUUCA (SEQ. ID. NO: 316)
hsa-miR-100891-5p	UGGAUUUCUUUGUGAAUCACCA (SEQ. ID. NO: 317)
hsa-miR-101001	ACCAGGAGGCUGAGGCCCCU (SEQ. ID. NO: 318)
hsa-miR-146b	UGAGAACUGAAUUCCAUAGGCU (SEQ. ID. NO: 319)
hsa-miR-147b	GUGUGCGGAAAUGCUUCUGCUA (SEQ. ID. NO: 320)
hsa-miR-181d	AACAUUCAUUGUUGUCGGUGGGU (SEQ. ID. NO: 321)
hsa-miR-18b	UAAGGUGCAUCUAGUGCAGUUAG (SEQ. ID. NO: 322)
hsa-miR-193b	AACUGGCCCUCAAAGUCCCGCU (SEQ. ID. NO: 323)
hsa-miR-200001	UGCAACGAACCUGAGCCACUGA (SEQ. ID. NO: 324)
hsa-miR-200002	AUAAUACAUGGUUAACCUCUUU (SEQ. ID. NO: 325)
hsa-miR-200003	UACUUGGAAAGGCAUCAGUUG (SEQ. ID. NO: 326)
hsa-miR-200004	UGCAACUUACCUGAGUCAUUGA (SEQ. ID. NO: 327)
hsa-miR-200007	GUAGAGGAGAUGGCGCAGGG (SEQ. ID. NO: 328)
hsa-miR-200008	UACCCAUUGCAUAUCGGAGUU (SEQ. ID. NO: 329)
hsa-miR-20b	CAAAGUGCUCAUAGUGCAGGUAG (SEQ. ID. NO: 330)
hsa-miR-20b-3p	ACUGUAGUAUGGGCACUUCCAG (SEQ. ID. NO: 331)
hsa-miR-216b	AAAUCUCUGCAGGCAAAUGUGA (SEQ. ID. NO: 332)
hsa-miR-301b	CAGUGCAAUGAUAUUGUCAAAGCA (SEQ. ID. NO: 333)
hsa-miR-329	AACACACCUGGUUAACCUCUUU (SEQ. ID. NO: 334)
hsa-miR-33b	GUGCAUUGCUGUUGCAUUGC (SEQ. ID. NO: 335)
hsa-miR-374b	AUAUAAUACAACCUGCUAAGUG (SEQ. ID. NO: 336)
hsa-miR-375	UUUGUUCGUUCGGCUCGCGUGA (SEQ. ID. NO: 337)
hsa-miR-376a	AUCAUAGAGGAAAAUCCACGU (SEQ. ID. NO: 338)

Name	Mature MicroRNA (5`-> 3`)
hsa-miR-376b	AUCAUAGAGGAAAAUCCAUGUU (SEQ. ID. NO: 339)
hsa-miR-376c	AAUCGUACAGGGUCAUCCACUU (SEQ. ID. NO: 340)
hsa-miR-376c	AAUCGUACAGGGUCAUCCACUU (SEQ. ID. NO: 341)
hsa-miR-377	AUCACACAAAGGCAACUUUUGU (SEQ. ID. NO: 342)
hsa-miR-378	ACUGGACUUGGAGUCAGAAGG (SEQ. ID. NO: 343)
hsa-miR-379	UGGUAGACUAUGGAACGUAGG (SEQ. ID. NO: 344)
hsa-miR-380	UAUGUAAUAUGGUCCACAUCUU (SEQ. ID. NO: 345)
hsa-miR-410	AAUAUAACACAGAUGGCCUGU (SEQ. ID. NO: 346)
hsa-miR-421-3p	AUCAACAGACAUUAAUUGGGCG (SEQ. ID. NO: 347)
hsa-miR-429	UAAUACUGUCUGGUAAAACCGU (SEQ. ID. NO: 348)
hsa-miR-431	UGUCUUGCAGGCCGUCAUGCA (SEQ. ID. NO: 349)
hsa-miR-432	UCUUGGAGUAGGUCAUUGGGUGG (SEQ. ID. NO: 350)
hsa-miR-433	AUCAUGAUGGGCUCCUCGGUGU (SEQ. ID. NO: 351)
hsa-miR-449a	UGGCAGUGUAUUGUUAGCUGGU (SEQ. ID. NO: 352)
hsa-miR-449b	AGGCAGUGUAUUGUUAGCUGGC (SEQ. ID. NO: 353)
hsa-miR-450a	UUUUGCGAUGUGUUCCUAAUAU (SEQ. ID. NO: 354)
hsa-miR-451	AAACCGUUACCAUUACUGAGUU (SEQ. ID. NO: 355)
hsa-miR-452	AACUGUUUGCAGAGGAAACUGA (SEQ. ID. NO: 356)
hsa-miR-453	AGGUUGUCCGUGGUGAGUUCGCA (SEQ. ID. NO: 357)
hsa-miR-454	UAGUGCAAUAUUGCUUAUAGGGU (SEQ. ID. NO: 358)
hsa-miR-455-5p	UAUGUGCCUUUGGACUACAUCG (SEQ. ID. NO: 359)
hsa-miR-484	UCAGGCUCAGUCCCCUCCCGAU (SEQ. ID. NO: 360)
hsa-miR-485-3p	GUCAUACACGGCUCUCCUCUCU (SEQ. ID. NO: 361)
hsa-miR-485-5p	AGAGGCUGGCCGUGAUGAAUUC (SEQ. ID. NO: 362)
hsa-mir-486__os	CGGGGCAGCUCAGUACAGGAU (SEQ. ID. NO: 3603)
hsa-miR-487	AAUCAUACAGGGACAUCCAGUU (SEQ. ID. NO: 364)
hsa-miR-488	UUGAAAGGCUAUUUCUUGGUCU (SEQ. ID. NO: 365)
hsa-miR-490	CCAUGGAUCUCCAGGUGGGU (SEQ. ID. NO: 366)
hsa-miR-493	UGAAGGUCUACUGUGUGCCAGG (SEQ. ID. NO: 367)
hsa-miR-497	CAGCAGCACACUGUGGUUUGU (SEQ. ID. NO: 368)
hsa-miR-502	AAUGCACCUGGGCAAGGAUUCA (SEQ. ID. NO: 369)
hsa-miR-503	UAGCAGCGGGAACAGUUCUGCAG (SEQ. ID. NO: 370)
hsa-miR-505	CGUCAACACUUGCUGGUUUCCU (SEQ. ID. NO: 371)
hsa-miR-509-3p	UGAUUGGUACGUCUGUGGGUAG (SEQ. ID. NO: 372)
hsa-miR-514	AUUGACACUUCUGUGAGUAGA (SEQ. ID. NO: 373)
hsa-miR-92b	UAUUGCACUCGUCCCGGCCUCC (SEQ. ID. NO: 374)

Table A3. MicroRNA Hairpin Precursor Sequences

Name	Hairpin Precursor (5` → 3`)
hsa-mir-100516	GGCAGUGCUCUACUCAAAAAGCUGUCAGUCACUUAGAUUACAUGUGACUG ACACCUCUUUGGGUGAAGGAAGGCUCA (SEQ. ID. NO: 375)
hsa-mir-100604	UUGGGCAAGGUGCGGGGCUAGGGCUAACAGCAGUCUUACUGAAGGUUUC CUGGAAACCACGCACAUGCUGUUGCCACUAACCUCAACCUUACUCGGUC (SEQ. ID. NO: 376)
hsa-mir-100610	UUCUCUCCUCCAUGCCUUGAGUGUAGGACCGUUGGCAUCUUAAUUACCCU CCCACACCCAAGGCUUGCAAAAAGCGAG (SEQ. ID. NO: 377)
hsa-mir-100631	AGGGGCGGGAGGGGGGUCCCCGGUGCUCGGAUCUCGAGGGUGCUUAUU GUUCGGUCCGAGCCUGGGUCUCCCUCUUCCCCCAACC (SEQ. ID. NO: 378)
hsa-mir-100701	AACUUGUUAGAAGGUUACUUGUUAGUUCAGGACCUCAUUACUUUCUGCCU GAACUAUUGCAGUAGCCUCCUAACUGGUUAU (SEQ. ID. NO: 379)
hsa-mir-100723	CCGAGCCUCCAGUACCACGUGUCAGGGCCACAUGAGCUGGGCCUCGUGG GCCUGAUGUGGUGCUGGGGCCUCAGGG (SEQ. ID. NO: 380)
hsa-mir-100730	UACUUAAUGAGAAGUUGCCCGUGUUUUUUUCGCUUUAUUUGUGACGAAAC AUUCGCGGUGCACUUCUUUUUCAGUAUC (SEQ. ID. NO: 381)
hsa-mir-100732	ACGUCAGGGAAAGGAUUCUGCUGUCGGUCCCACUCCAAAGUUCACAGAAU GGGUGGUGGGCACAGAAUCUGGACUCUGCUUGUG (SEQ. ID. NO: 382)
hsa-mir-100754	UGCUUCUGUGUGAUAUGUUUGAUAUUGGGUUGUUUAAUUAGGAACCAAC UAAAUGUCAAACAUAUUCUUACAGCAGCAG (SEQ. ID. NO: 383)
hsa-mir-100760	CCUGAGCCUUGCACUGAGAUGGGAGUGGUGUAAGGCUCAGGUAUGCACA GCUCCCAUCUCAGAACAAGGCUCGGGUG (SEQ. ID. NO: 384)
hsa-mir-100814	GUGUGCAUUUGCAGGAACUUGUGAGUCUCCUAUUGAAAAUGAACAGGAGA CUGAUGAGUUCCCGGGAACACCCACAA (SEQ. ID. NO: 385)
hsa-mir-100815	AUGCACUGCACAACCCUAGGAGAGGGUGCCAUUCACAUAGACUAUAAUUG AAUGGCGCCACUAGGGUUGUGCAGUGCACAA (SEQ. ID. NO: 386)
hsa-mir-100818	UAGAGGGAUGAGGGGAAAGUUCUAUAGUCCUGUAAUUAGAUCUCAGGA CUAUAGAACUUUCCCCCUCAUCCCUCUGCC (SEQ. ID. NO: 387)
hsa-mir-100819	CCGCACUCUCUCCAUUACACUACCCUGCCUCUUCUCCAUGAGAGGCAGCG GGGUGUAGUGGAUAGAGCACGGGU (SEQ. ID. NO: 388)
hsa-mir-100824	UCAUACUUGAGGAGAAAUUAUCCUUGGUGUGUUCGCUUUAUUUAUGAUG AAUCAUACAAGGACAAUUUCUUUUUGAGUAUCAAA (SEQ. ID. NO: 389)
hsa-mir-100825	CUCAGACAUCUCGGGGAUCAUCAUGUCACGAGAUACCAGUGUGCACUUGU GACAGAUUGAUAACUGAAAGGUCUGGGAG (SEQ. ID. NO: 390)
hsa-mir-100829	AGUCAGAAAUGAGCUUAUUCAUAAAAGUGCAGUAUGGUGAAGUCAAUCUG UAAUUUUAUGUAUAAGCUAGUCUCUGAUUGA (SEQ. ID. NO: 391)
hsa-mir-100835	CAGGAAGAGGAGGAAGCCCUGGAGGGGCUGGAGGUGAUGGAUGUUUCC UCCGGUUCUCAGGGCUCCACCUCUUUCGGGCC (SEQ. ID. NO: 392)
hsa-mir-100842	AGGUGGGUGCAAAGGUAAUUGCAGUUUUUCCCAUUAUUUUAAUUGCGAAA ACAGCAAUUACCUUUGCACCAACCUGA (SEQ. ID. NO: 393)
hsa-mir-100843	AACUGCCCUCAAGGAGCUUACAAUCUAGCUGGGGGUAAAUGACUUGCACA UGAACACAACUAGACUGUGAGCUUCUAGAGGGCAGGGA (SEQ. ID. NO: 394)
hsa-mir-100846	GGCGCGUCGCCCCCCUCAGUCCACCAGAGCCCGGAUACCUCAGAAAUUCG GCUCUGGGUCUGUGGGGAGCGAAAUGCAAC (SEQ. ID. NO: 395)
hsa-mir-100851	GUGCAGAUCCUUGGGAGCCCUGUUAGACUCUGGAUUUUACACUUGGAGU GAACGGGCGCCAUCCCGAGGCUUUGCACAG (SEQ. ID. NO: 396)

Name	Hairpin Precursor (5` → 3`)
hsa-mir-100852	CAUUAGUAGGCCUCAGUAAAUGUUUAUUAGAUGAAUAAAUGAAUGACUCA UCAGCAAACAUUUAUUGUGUGCCUGCUAAAGU (SEQ. ID. NO: 397)
hsa-mir-100854	UUAGCCCUGCGGCCCCACGCACCAGGGUAAGAGAGACUCUCGCUUCCUGC CCUGGCCCGAGGGACCGACUGGCUGGGC (SEQ. ID. NO: 398)
hsa-mir-100855	UGCGGGCGUGUGAGUGUGUGUGUGUGAGUGUGUGUCGCUCCGGGUCCA CGCUCAUGCACACACCCACACGCCCACACU (SEQ. ID. NO: 399)
hsa-mir-100869	UAAGUGGAAAGAUGGUGGGCCGCAGAACAUGUGCUGAGUUCGUGCCAUA UGUCUGCUGACCAUCACCUUUAGAAGCCCC (SEQ. ID. NO: 400)
hsa-mir-100871	CACUCCUACCCGGGUCGGAGUUAGCUCAAGCGGUUACCUCCUCAUGCCGG ACUUUCUAUCUGUCCAUCUCUGUGCUGGGGUUCGAGACCCGCGGGUGCU UACUGACCCUUUUAUGCAAUAA (SEQ. ID. NO: 401)
hsa-mir-100885	CCUGGCCCAUGAAAUCAAGCGUGGGUGAGACCUGGUGCAGAACGGGAAG GCGACCCAUACUUGGUUUCAGAGGCUGUGAG (SEQ. ID. NO: 402)
hsa-mir-100887	UUAGUGGUACUAUACCUCAGUUUUAUCAGGUGUUCUUAAAAUCACCUGGA AACACUGAGGUUGUGUCUCACUGAAC (SEQ. ID. NO: 403)
hsa-mir-100891	UGAAGUGCUGUGGAUUUCUUUGUGAAUCACCAUAUCUAAGCUAAUGUGG UGGUGGUUUACAAAGUAAUUCAUAGUGCUUCA (SEQ. ID. NO: 404)
hsa-mir-101001	UCUCCUCGAGGGGUCUCUGCCUCUACCCAGGACUCUUUCAUGACCAGGAG GCUGAGGCCCCUCACAGGCGGC (SEQ. ID. NO: 405)
hsa-mir-146b	CACCUGGCACUGAGAACUGAAUUCCAUAGGCUGUGAGCUCUAGCAAUGCC CUGUGGACUCAGUUCUGGUGCCCGGCAGU (SEQ. ID. NO: 406)
hsa-mir-147b	UAUAAAUCUAGUGGAAACAUUUCUGCACAAACUAGAUUCUGGACACCAGU GUGCGGAAAUGCUUCUGCUACAUUUUUAGG (SEQ. ID. NO: 407)
hsa-mir-181d	GGUCACAAUCAACAUUCAUUGUUGUCGGUGGGUUGUGAGGACUGAGGCC AGACCCACCGGGGGAUGAAUGUCACUGUGGCUGGG (SEQ. ID. NO: 408)
hsa-mir-18b	UCUCUUGUGUUAAGGUGCAUCUAGUGCAGUUAGUGAAGCAGCUUAGAAU CUACUGCCCUAAAUGCCCCUUCUGGCACAGGCUGCC (SEQ. ID. NO: 409)
hsa-mir-193b	GUCUCAGAAUCGGGGUUUUGAGGGCGAGAUGAGUUUAUGUUUUAUCCAA CUGGCCCUCAAAGUCCCGCUUUUGGGGUCA (SEQ. ID. NO: 410)
hsa-mir-200001	CCUUAAUCCUUGCAACGAACCUGAGCCACUGAUUCAGUAAAAUACUCAGU GGCACAUGUUUGUUGUGAGGGUCAAAAGA (SEQ. ID. NO: 411)
hsa-mir-200002	AUAUUUGAGGAGAGGUUAUCCGUGUUAUGUUCGCUUCAUUCAUCAUGAAU AAUACAUGGUUAACCUCUUUUUGAAUAUCA (SEQ. ID. NO: 412)
hsa-mir-200003	GGAAGUGCCCUACUUGGAAAGGCAUCAGUUGCUUAGAUUACAUGUAACUA UUCCCUUUCUGAGUAGAGUAAGUCUUA (SEQ. ID. NO: 413)
hsa-mir-200004	CCUUAAUCCUUGCAACUUACCUGAGUCAUUGAUUCAGUAAAACAUUCAAU GGCACAUGUUUGUUGUUAGGGUCAAAAGA (SEQ. ID. NO: 414)
hsa-mir-200007	GCUAGAGAAGGUAGAGGAGAUGGCGCAGGGGACACGGGCAAAGACUUGG GGGUUCCUGGGACCCUCAGACGUGUGUCCUCUUCUCCCUCCUCCCAGGU GUAUG (SEQ. ID. NO: 415)
hsa-mir-200008	CCUUCUCCCAUACCCAUUGCAUAUCGGAGUUGUGAAUUCUCAAAACACCU CCUGUGUGCAUGGAUUACAGGAGGGUGA (SEQ. ID. NO: 416)
hsa-mir-20b	CUAGUAGUACCAAAGUGCUCAUAGUGCAGGUAGUUUUGGCAUGACUCUAC UGUAGUAUGGGCACUUCCAGUACUCUUGGA (SEQ. ID. NO: 417)
hsa-mir-216b	GCAGACUGGAAAAUCUCUGCAGGCAAAUGUGAUGUCACUGAGGAAAUCAC ACACUUACCCGUAGAGAUUCUACAGUCUGACA (SEQ. ID. NO: 418)
hsa-mir-301b	GCCGCAGGUGCUCUGACGAGGUUGCACUACUGUGCUCUGAGAAGCAGUG CAAUGAUAUUGUCAAAGCAUCUGGGACCA (SEQ. ID. NO: 419)

Name	Hairpin Precursor (5` → 3`)
hsa-mir-329-1	GUACCUGAAGAGAGGUUUUCUGGGUUUCUGUUUCUUUAAUGAGGACGAA ACACACCUGGUUAACCUCUUUUCCAGUAUCA (SEQ. ID. NO: 420)
hsa-mir-329-2	GUACCUGAAGAGAGGUUUUCUGGGUUUCUGUUUCUUUAUUGAGGACGAA ACACACCUGGUUAACCUCUUUUCCAGUAUCA (SEQ. ID. NO: 421)
hsa-mir-33b	CGGCCCCGCGGUGCAUUGCUGUUGCAUUGCACGUGUGUGAGGCGGGUGC AGUGCCUCGGCAGUGCAGCCCGGAGCCGGCC (SEQ. ID. NO: 422)
hsa-mir-374b	ACUCGGAUGGAUAUAAUACAACCUGCUAAGUGUCCUAGCACUUAGCAGGU UGUAUUAUCAUUGUCCGUGUCU (SEQ. ID. NO: 423)
hsa-mir-375	CUCCCGCCCCGCGACGAGCCCCUCGCACAAACCGGACCUGAGCGUUUUGU UCGUUCGGCUCGCGUGAGGCAGGGGCG (SEQ. ID. NO: 424)
hsa-mir-376a-1	UAUUUAAAAGGUAGAUUCUCCUUCUAUGAGUACAUUAUUUAUGAUUAAUC AUAGAGGAAAAUCCACGUUUUCAGUAUC (SEQ. ID. NO: 425)
hsa-mir-376a-2	UAUUUAAAAGGUAGAUUUUCCUUCUAUGGUUACGUGUUUGAUGGUUAAUC AUAGAGGAAAAUCCACGUUUUCAGUAUC (SEQ. ID. NO: 426)
hsa-mir-376b	GUAUUUAAAACGUGGAUAUUCCUUCUAUGUUUACGUGAUUCCUGGUUAAU CAUAGAGGAAAAUCCAUGUUUUCAGUAUCA (SEQ. ID. NO: 427)
hsa-mir-376c	UAUUUAAAAGGUGGAUAUUCCUUCUAUGUUUAUGUUAUUUAUGGUUAAAC AUAGAGGAAAUUCCACGUUUUCAGUAUC (SEQ. ID. NO: 428)
hsa-mir-376c	UAUUUAAAAGGUGGAUAUUCCUUCUAUGUUUAUGUUAUUUAUGGUUAAAC AUAGAGGAAAUUCCACGUUUUCAGUAUC (SEQ. ID. NO: 429)
hsa-mir-377	ACCCUUGAGCAGAGGUUGCCCUUGGUGAAUUCGCUUUAUUUAUGUUGAA UCACACAAAGGCAACUUUUGUUUGAGUAUCA (SEQ. ID. NO: 430)
hsa-mir-378	CACCCAGGGCUCCUGACUCCAGGUCCUGUGUGUUACCUAGAAAUAGCACU GGACUUGGAGUCAGAAGGCCUGAGUGGA (SEQ. ID. NO: 431)
hsa-mir-379	CCUGAAGAGAUGGUAGACUAUGGAACGUAGGCGUUAUGAUUUCUGACCUA UGUAACAUGGUCCACUAACUCUCAGUAUC (SEQ. ID. NO: 432)
hsa-mir-380	ACCUGAAAAGAUGGUUGACCAUAGAACAUGCGCUAUCUCUGUGUCGUAUG UAAUAUGGUCCACAUCUUCUCAAUAUCA (SEQ. ID. NO: 433)
hsa-mir-410	ACCUGAGAAGAGGUUGUCUGUGAUGAGUUCGCUUUUAUUAAUGACGAAUA UAACACAGAUGGCCUGUUUUCAGUACC (SEQ. ID. NO: 434)
hsa-mir-421	CAUUGUAGGCCUCAUUAAAUGUUUGUUGAAUGAAAAAAUGAAUCAUCAAC AGACAUUAAUUGGGCGCCUGCUCUGU (SEQ. ID. NO: 435)
hsa-mir-429	GCCGAUGGGCGUCUUACCAGACAUGGUUAGACCUGGCCCUCUGUCUAAUA CUGUCUGGUAAAACCGUCCAUCCGCUG (SEQ. ID. NO: 436)
hsa-mir-431	UCCUGCGAGGUGUCUUGCAGGCCGUCAUGCAGGCCACACUGACGGUAAC GUUGCAGGUCGUCUUGCAGGGCUUCUCGCAAGACG (SEQ. ID. NO: 437)
hsa-mir-432	CUCCUCCAGGUCUUGGAGUAGGUCAUUGGGUGGAUCCUCUAUUUCCUUA CGUGGGCCACUGGAUGGCUCCUCCAUGUCUUGGAGUAGAU (SEQ. ID. NO: 438)
hsa-mir-433	CGGGGAGAAGUACGGUGAGCCUGUCAUUAUUCAGAGAGGCUAGAUCCUC UGUGUUGAGAAGGAUCAUGAUGGGCUCCUCGGUGUUCUCCAGGUA (SEQ. ID. NO: 439)
hsa-mir-449a	UGUGAUGAGCUGGCAGUGUAUUGUUAGCUGGUUGAAUAUGUGAAUGGCA UCGGCUAACAUGCAACUGCUGUCUUAUUGCAUA (SEQ. ID. NO: 440)
hsa-mir-449b	UGAAUCAGGUAGGCAGUGUAUUGUUAGCUGGCUGCUUGGGUCAAGUCAG CAGCCACAACUACCCUGCCACUUGCUUCUGGA (SEQ. ID. NO: 441)
hsa-mir-450a-1	ACUAAACUGUUUUUGCGAUGUGUUCCUAAUAUGCACUAUAAAUAUAUUGG GAACAUUUUGCAUGUAUAGUUUUGUAU (SEQ. ID. NO: 442)

Name	Hairpin Precursor (5` → 3`)
hsa-mir-450a-2	GCUAAACUAUUUUUGCGAUGUGUUCCUAAUAUGUAAUAUAAAUGUAUUGG GGACAUUUUGCAUUCAUAGUUUUGUAU (SEQ. ID. NO: 443)
hsa-mir-451	AAUGGCAAGGAAACCGUUACCAUUACUGAGUUUAGUAAUGGUAAUGGUUC UCUUGCUAUACC (SEQ. ID. NO: 444)
hsa-mir-452	AAGCACUUACAACUGUUUGCAGAGGAAACUGAGACUUUGUAACUAUGUCU CAGUCUCAUCUGCAAAGAAGUAAGUGCUUUGCC (SEQ. ID. NO: 445)
hsa-mir-453	AGAAGAUGCAGGAAUGCUGCGAGCAGUGCCACCUCAUGGUACUCGGAGG GAGGUUGUCCGUGGUGAGUUCGCAUUAUUUAA (SEQ. ID. NO: 446)
hsa-mir-454	AUCCUAGAACCCUAUCAAUAUUGUCUCUGCUGUGUAAAUAGUUCUGAGUA GUGCAAUAUUGCUUAUAGGGUUUUGGUGUUU (SEQ. ID. NO: 447)
hsa-mir-455	GGCGUGAGGGUAUGUGCCUUUGGACUACAUCGUGGAAGCCAGCACCAUG CAGUCCAUGGGCAUAUACACUUGCCUCAAG (SEQ. ID. NO: 448)
hsa-mir-484	CUGGGAACCCCGGGGGGGGCGGGGCCUCGCGGCCCUGCAGCCUCGUCAG GCUCAGUCCCCUCCCGAUAAACCCCUAA (SEQ. ID. NO: 449)
hsa-mir-485	GUACUUGGAGAGAGGCUGGCCGUGAUGAAUUCGAUUCAUCAAAGCGAGU CAUACACGGCUCUCCUCUCUUUUAGUGUCA (SEQ. ID. NO: 450)
hsa-mir-486__os	CCCUGGGGCAUCCUGUACUGAGCUGCCCCGAGGCCCUUCAUGCUGCCCAG CUCGGGGCAGCUCAGUACAGGAUACUCGGGGUGG (SEQ. ID. NO: 451)
hsa-mir-487	UACUUGAAGAGUGGUUAUCCCUGCUGUGUUCGCUUAAUUUAUGACGAAUC AUACAGGGACAUCCAGUUUUUCAGUAUC (SEQ. ID. NO: 452)
hsa-mir-488	AAUCAUCUCUCCCAGAUAAUGGCACUCUCAAACAAGUUUCCAAAUUGUUU GAAAGGCUAUUUCUUGGUCAGAUGACUCU (SEQ. ID. NO: 453)
hsa-mir-490	UUGUUCGACACCAUGGAUCUCCAGGUGGGUCAAGUUUAGAGAUGCACCAA CCUGGAGGACUCCAUGCUGUUGAGCUGUU (SEQ. ID. NO: 454)
hsa-mir-493	CUCCAGGGCUUUGUACAUGGUAGGCUUUCAUUCAUUCGUUUGCACAUUCG GUGAAGGUCUACUGUGUGCCAGGCCCUGUGCCA (SEQ. ID. NO: 455)
hsa-mir-497	GCUCCCGCCCCAGCAGCACACUGUGGUUUGUACGGCACUGUGGCCACGUC CAAACCACACUGUGGUGUUAGAGCGAGGGUGGGGGAG (SEQ. ID. NO: 456)
hsa-mir-502	CCCCUCUCUAAUCCUUGCUAUCUGGGUGCUAGUGCUGGCUCAAUGCAAUG CACCUGGGCAAGGAUUCAGAGAGGGGGA (SEQ. ID. NO: 457)
hsa-mir-503	AGCCGUGCCCUAGCAGCGGGAACAGUUCUGCAGUGAGCGAUCGGUGCUC UGGGGUAUUGUUUCCGCUGCCAGGGUAAGUCUGG (SEQ. ID. NO: 458)
hsa-mir-505	ACCCAGUGGGGGAGCCAGGAAGUAUUGAUGUUUCUGCCAGUUUAGCGUC AACACUUGCUGGUUUCCUCUCUGGAGCA (SEQ. ID. NO: 459)
hsa-mir-509-1	GUGGUACCCUACUGCAGACAGUGGCAAUCAUGUAUAAUUAAAAAUGAUUG GUACGUCUGUGGGUAGAGUACUGCAU (SEQ. ID. NO: 460)
hsa-mir-509-2	GUGGUACCCUACUGCAGACGUGGCAAUCAUGUAUAAUUAAAAAUGAUUGG UACGUCUGUGGGUAGAGUACUGCAU (SEQ. ID. NO: 461)
hsa-mir-509-3	GUGGUACCCUACUGCAGACAGUGGCAAUCAUGUAUAAUUAAAAAUGAUUG GUACGUCUGUGGGUAGAGUACUGCAU (SEQ. ID. NO: 462)
hsa-mir-514-1	CUGUGGUACCCUACUCUGGAGAGUGACAAUCAUGUAUAAUUAAAUUUGAU UGACACUUCUGUGAGUAGAGUAACGCAUGA (SEQ. ID. NO: 463)
hsa-mir-514-2	CUGUGGUACCCUACUCUGGAGAGUGACAAUCAUGUAUAACUAAAUUUGAU UGACACUUCUGUGAGUAGAGUAACGCAUGA (SEQ. ID. NO: 464)
hsa-mir-514-3	CUGUGGUACCCUACUCUGGAGAGUGACAAUCAUGUAUAACUAAAUUUGAU UGACACUUCUGUGAGUAGAGUAACGCAUGA (SEQ. ID. NO: 465)
hsa-mir-92b	GGCGGGCGGGAGGGACGGACGCGGUGCAGUGUUGUUUUUCCCCCGCC AAUAUUGCACUCGUCCCGGCCUCCGGCCCCCCCG (SEQ. ID. NO: 466)

Table A4. MicroRNA Sequences

Name	Mature MicroRNA (5' to 3')
hsa-miR-100516	UACUCAAAAAGCUGUCAGUCA (SEQ. ID. NO: 467)
hsa-miR-100701	AAGGUUACUUGUUAGUUCAGG (SEQ. ID. NO: 468)
hsa-miR-100760	GCACUGAGAUGGGAGUGGUGUA (SEQ. ID. NO: 469)
hsa-miR-100885	GCGACCCAUACUUGGUUUCAG (SEQ. ID. NO: 470)
hsa-miR-100887-3p	CCUGGAAACACUGAGGUUGUGU (SEQ. ID. NO: 471)
hsa-miR-100887-5p	UAUACCUCAGUUUUAUCAGGUG (SEQ. ID. NO: 472)
hsa-miR-100891-3p	UGGUGGUUUACAAAGUAAUUCA (SEQ. ID. NO: 473)
hsa-miR-100891-5p	UGGAUUUCUUUGUGAAUCACCA (SEQ. ID. NO: 474)
hsa-miR-200001	UGCAACGAACCUGAGCCACUGA (SEQ. ID. NO: 475)
hsa-miR-200002	AUAAUACAUGGUUAACCUCUUU (SEQ. ID. NO: 476)
hsa-miR-200003	UACUUGGAAAGGCAUCAGUUG (SEQ. ID. NO: 477)
hsa-miR-200004	UGCAACUUACCUGAGUCAUUGA (SEQ. ID. NO: 478)
hsa-miR-200007	GUAGAGGAGAUGGCGCAGGG (SEQ. ID. NO: 479)
hsa-miR-200008	UACCCAUUGCAUAUCGGAGUU (SEQ. ID. NO: 480)
hsa-mir-486__os	CGGGGCAGCUCAGUACAGGAU (SEQ. ID. NO: 481)

Table A5. MicroRNA Hairpin Precursor Sequences

Name	Hairpin Precursor (5` → 3`)
hsa-miR-100516	GGCAGUGCUCUACUCAAAAAGCUGUCAGUCACUUAGA UUACAUGUGACUGACACCUCUUUGGGUGAAGGAAGGCUCA (SEQ. ID. NO: 482)
hsa-miR-100701	AACUUGUUAGAAGGUUACUUGUUAGUUCAGGACCUCAUU ACUUUCUGCCUGAACUAUUGCAGUAGCCUCCUAACUGGUUAU (SEQ. ID. NO: 483)
hsa-miR-100760	CCUGAGCCUUGCACUGAGAUGGGAGUGGUGUAAGGCUCAGG UAUGCACAGCUCCCAUCUCAGAACAAGGCUCGGGUG (SEQ. ID. NO: 484)
hsa-miR-100885	CCUGGCCCAUGAAAUCAAGCGUGGGUGAGACCUGGUGCAG AACGGGAAGGCGACCCAUACUUGGUUUCAGAGGCUGUGAG (SEQ. ID. NO: 485)

hsa-miR-100887-3p	UUAGUGGUACUAUACCUCAGUUUUAUCAGGUGUUCUUAAA AUCACCUGGAAACACUGAGGUUGUGUCUCACUGAAC (SEQ. ID. NO: 486)
hsa-miR-100887-5p	UUAGUGGUACUAUACCUCAGUUUUAUCAGGUGUUCUUAAA AUCACCUGGAAACACUGAGGUUGUGUCUCACUGAAC (SEQ. ID. NO: 487)
hsa-miR-100891-3p	UGAAGUGCUGUGGAUUUCUUUGUGAAUCACCAUAUCUAAGC UAAUGUGGUGGUGGUUUACAAAGUAAUUCAUAGUGCUUCA (SEQ. ID. NO: 488)
hsa-miR-100891-5p	UGAAGUGCUGUGGAUUUCUUUGUGAAUCACCAUAUCUAAGC UAAUGUGGUGGUGGUUUACAAAGUAAUUCAUAGUGCUUCA (SEQ. ID. NO: 489)
hsa-miR-200001	CCUUAAUCCUUGCAACGAACCUGAGCCACUGAUUCAGUAAAA UACUCAGUGGCACAUGUUUGUUGUGAGGGUCAAAAGA (SEQ. ID. NO: 490)
hsa-miR-200002	AUAUUUGAGGAGAGGUUAUCCGUGUUAUGUUCGCUUCAUUCA UCAUGAAUAAUACAUGGUUAACCUCUUUUUGAAUAUCA (SEQ. ID. NO: 491)
hsa-miR-200003	GGAAGUGCCCUACUUGGAAAGGCAUCAGUUGCUUAGAUUACAU GUAACUAUUCCCUUUCUGAGUAGAGUAAGUCUUA (SEQ. ID. NO: 492)
hsa-miR-200004	CCUUAAUCCUUGCAACUUACCUGAGUCAUUGAUUCAGUAAAAC AUUCAAUGGCACAUGUUUGUUGUUAGGGUCAAAAGA (SEQ. ID. NO: 493)
hsa-miR-200007	GCUAGAGAAGGUAGAGGAGAUGGCGCAGGGGACACGGGCAAAG ACUUGGGGGUUCCUGGGACCCUCAGACGUGUGUCCUCUUCUCCC UCCUCCCAGGUGUAUG (SEQ. ID. NO: 494)
hsa-miR-200008	CCUUCUCCCAUACCCAUUGCAUAUCGGAGUUGUGAAUUCUC AAAACACCUCCUGUGUGCAUGGAUUACAGGAGGGUGA (SEQ. ID. NO: 495)
hsa-mir-486__os	CCCUGGGGCAUCCUGUACUGAGCUGCCCCGAGGCCCUUCAU GCUGCCCAGCUCGGGGCAGCUCAGUACAGGAUACUCGGGGUGG (SEQ. ID. NO: 496)

Table A6. MicroRNA Sequences

name	MicroRNA (5' → 3')
hsa-mir-18b-3p	CUGCCCUAAAUGCCCCUUCUGGC (SEQ. ID. NO: 497)
hsa-miR-618	UUAAUAUGUACUGACAAAGCGU (SEQ. ID. NO: 498)
hsa-miR-619	UUUCCGGCUCGCGUGGGUGUGU (SEQ. ID. NO: 499)

hsa-miR-620	AUGUUGGGAGCGGGCAGGUUGG (SEQ. ID. NO: 500)
hsa-miR-723-5p	AGUACCACGUGUCAGGGCCACAUGA (SEQ. ID. NO: 501)
hsa-mir-816	UUGGGGAAACGGCCGCUGAGUGA (SEQ. ID. NO: 502)
hsa-mir-817	CUGUAUGCCCUCACCGCUCAGC (SEQ. ID. NO: 503)
hsa-mir-821-1	GCGGCGGCGGCGGAGGCU (SEQ. ID. NO: 504)
hsa-mir-821-2/3	GCGGCGGCGGCGGAGGCU (SEQ. ID. NO: 505)
hsa-mir-828-3p	UCUAGUAAGAGUGGCAGUCGA (SEQ. ID. NO: 506)
hsa-mir-828-5p	AUGCUGACAUAUUUACUAGAGG (SEQ. ID. NO: 507)
hsa-mir-831-1	UGGGGCGGAGCUUCCGGAGGCC (SEQ. ID. NO: 508)
hsa-mir-831-2	UGGGGCGGAGCUUCCGGAGGCC (SEQ. ID. NO: 509)
hsa-mir-831-3/-4/-5	UGGGGCGGAGCUUCCGGAGGCC (SEQ. ID. NO: 510)
hsa-mir-840-3p	ACUCGGCGUGGCGUCGGUCGUGG (SEQ. ID. NO: 511)
hsa-mir-840-5p	UCGACCGGACCUCGACCGGCUC (SEQ. ID. NO: 512)
hsa-mir-845-1	AAAGCAUGCUCCAGUGGCGC (SEQ. ID. NO: 513)
hsa-mir-845-2	AAAGCAUGCUCCAGUGGCGC (SEQ. ID. NO: 514)
hsa-mir-847	CAGAGAGGACCACUAUGGCGGG (SEQ. ID. NO: 515)
hsa-mir-848	AUUGCCAUCCCCUAUGGACCAG (SEQ. ID. NO: 516)
hsa-mir-849	UGUCUACUACUGGAGACACUGG (SEQ. ID. NO: 517)
hsa-mir-850	UUAGGGCCCUGGCUCCAUCUCC (SEQ. ID. NO: 518)
hsa-mir-853	UGGGAUCUCCGGGGUCUUGGUU (SEQ. ID. NO: 519)
hsa-mir-857	AAGGCAGGGCCCCCGCUCCCCGG (SEQ. ID. NO: 520)
hsa-mir-864	AAAAGCUGAGUUGAGAGG (SEQ. ID. NO: 521)
hsa-mir-151	UCGAGGAGCUCACAGUCUAGA (SEQ. ID. NO: 522)

Table A7. MicroRNA Hairpin Precursor Sequences.

name	Hairpin Precursor (5' → 3')
>hsa-mir-18b-3p	CUUGUGUUAAGGUGCAUCUAGUGCAGUUAGUGAAGCAGCUUAGA AUCUACUGCCCUAAAUGCCCCUUCUGGCACAGG (SEQ. ID. NO: 523)
>hsa-miR-618	UUAUUGUGAAAUAUGUCAUUAAUAUGUACUGACAAAGCGUAUCUG UGUAAUAAAUAUGCUUUUUGUCAGUACAUGUUAAUGGUAUAUUUC AUAACAA (SEQ. ID. NO: 524)
>hsa-miR-619	GCGGCUGCUGGACCCACCCGGCCGGGAAUAGUGCUCCUGGUUGUU UCCGGCUCGCGUGGGUGUGUCGGCGGCGGG (SEQ. ID. NO: 525)
>hsa-miR-620	CGCCCCCACGUGGCCCCGCCCCCUGAGGCCGGCGCUGCCGCCAUGU UGGGAGCGGGCAGGUUGGGAGCG (SEQ. ID. NO: 526)
>hsa-miR-723-5p	GCCACCUUCCGAGCCUCCAGUACCACGUGUCAGGGCCACAUGAGCUG GGCCUCGUGGGCCUGAUGUGGUGCUGGGGCCUCAGGGGUCUG (SEQ. ID. NO: 527)
>hsa-mir-816	GGGUUUGGGGAAACGGCCGCUGAGUGAGGCGUCGGCUGUGUUUCUC ACCGCGGUCUUUUCCUCCCACUC (SEQ. ID. NO: 528)
>hsa-mir-817	CUUGGUGACGCUGUAUGCCCUCACCGCUCAGCCCCUGGGGCUGGCUU GGCAGACAGUACAGCAUCCAGGGGAGUCAAGGGCAUGGGGCGAGACC AGA (SEQ. ID. NO: 529)
>hsa-mir-821-1	GCGGCGGCGGCGGAGGCUGCUGCUGGGGCGGCUGCUGCUGGGGCGG CUGCGGCGGCGGCUGCUGCGGGGGCUGCUGCUGCUGUUGC (SEQ. ID. NO: 530)
>hsa-mir-821-2/3	GCGGCUGCGGCGGCGGCGGAGGCUGCGGCGGCGACCGUGGCAGAGGC GGUGGCGGAGGCCUCCGUGGCGGAGGCGGAAGC (SEQ. ID. NO: 531)

>hsa-mir-828-3p	CUUCCUCAUGCUGACAUAUUUACUAGAGGGUAAAAUUAAUAACCUUCUA GUAAGAGUGGCAGUCGAAGGGAAG (SEQ. ID. NO: 532)
>hsa-mir-828-5p	CUUCCUCAUGCUGACAUAUUUACUAGAGGGUAAAAUUAAUAACCUUCUA GUAAGAGUGGCAGUCGAAGGGAAG (SEQ. ID. NO: 533)
>hsa-mir-831-1	GCUCCGCCCCACGUCGCAUGCGCCCCGGGAACGCGUGGGGCGGAGC UUCCGGAGGCCCCGCUCUGCUGCCGACCCUGUGGAGCGGAGGGUGA AGCCUCCGGAUGCCAGUCCCUCAUCGCUGGCCUGGUCGCGCUGUGG CGAAGGGGGCGGAGC (SEQ. ID. NO: 534)
>hsa-mir-831-2	GCUCCGCCCCACGUCGCAUGCGCCCCGGGAACGCGUGGGGCGGAGC UUCCGGAGGCCCCGCCCUGCUGCCGACCCUGUGGAGCGGAGGGUGA AGCCUCCGGAUGCCAGUCCCUCAUCGCUGGCCCGGUCGCGCUGUGG CGAAGGGGGCGGAGC (SEQ. ID. NO: 535)
>hsa-mir-831-3/-4/-5	CGCUCCGCCCCACGUCGCAUGCGCCCCGGGAAAGCGUGGGGCGGAG CUUCCGGAGGCCCCGCCCUGCUGCCGACCCUGUGGAGCGGAGGGUG AAGCCUCCGGAUGCCAGUCCCUCAUCGCUGGCCCGGUCGCGCUGUG GCGAAGGGGGCGGAGC (SEQ. ID. NO: 536)
>hsa-mir-840-3p	UUCAUCAAGACCCAGCUGAGUCACUGUCACUGCCUACCAAUCUCGAC CGGACCUCGACCGGCUCGUCUGUGUUGCCAAUCGACUCGGCGUGGC GUCGGUCGUGGUAGAUAGGCGGUCAUGCAUACGAAUUUUCAGCUCU UGUUCUGGUGAC (SEQ. ID. NO: 537)
>hsa-mir-840-5p	UUCAUCAAGACCCAGCUGAGUCACUGUCACUGCCUACCAAUCUCGAC CGGACCUCGACCGGCUCGUCUGUGUUGCCAAUCGACUCGGCGUGGC GUCGGUCGUGGUAGAUAGGCGGUCAUGCAUACGAAUUUUCAGCUCU UGUUCUGGUGAC (SEQ. ID. NO: 538)
>hsa-mir-845-1	CGCGAGGCCGGGGUCGAGCGCUUCAGUAGCUCAUGGCUCUGUAGAG UGCGCAUGGCCAAGCAAAGGAAAGCAUGCUCCAGUGGCGCA (SEQ. ID. NO: 539)
>hsa-mir-845-2	AGUAACCACUUAGUGUGUAUUGACUUGUCAGAAUUUUCAGAAUUUAA AGCAUGCUCCAGUGGCGCA (SEQ. ID. NO: 540)
>hsa-mir-847	UUACUGUGUCAUUGUUGCUGUCAUUGCUACUGAGGAGUACUGACCAG AAUCAUCUGCAACUCUUAGUUGGCAGAGAGGACCACUAUGGCGGGUAG (SEQ. ID. NO: 541)
>hsa-mir-848	UGGGCCAGAUUGCCAUCCCCUAUGGACCAGAAGCCAAGGAUCUCUCUA GUGAUGGUCAGAGGGCCCAAAUGGCAGGGAUACCCA (SEQ. ID. NO: 542)
>hsa-mir-849	GCUUCUGUCUACUACUGGAGACACUGGUAGUAUAAAACCCAGAGUCUC CAGUAAUGGACGGGAGC (SEQ. ID. NO: 543)
>hsa-mir-850	CUGGGUUAGGGCCCUGGCUCCAUCUCCUUUAGGAAAACCUUCUGUGGG GAGUGGGGCUUCGACCCUAACCCAG (SEQ. ID. NO: 544)
>hsa-mir-853	CCUGGGCUCUGACCUGAGACCUCUGGGUUCUGAGCUGUGAUGUUGCUC UCGAGCUGGGAUCUCCGGGGUCUUGGUUCAGGG (SEQ. ID. NO: 545)
>hsa-mir-857	GGGCCCGGCCCCAGGAGCGGGGCCUGGGCAGCCCCGUGUGUUGAGGAA GGAAGGCAGGGCCCCCGCUCCCCGGGCCU (SEQ. ID. NO: 546)
>hsa-mir-864	CCUUCUCUUCUCAGUUCUUCCCCAAGUUAGGAAAAGCUGAGUUGAGAGGG (SEQ. ID. NO: 547)
>hsa-mir-151	GUCUCUCUUCAGGGCUCCCGAGACACAGAAACAGACACCUGCCCUCGAG GAGCUCACAGUCUAGAC (SEQ. ID. NO: 548)

Table A8. MicroRNA Sequence and Hairpin Precursor Sequence

Name	Mature MicroRNA (5` → 3`)	Hairpin Precursor Sequence
hsa-miR-544	AUUCUGCAU UUUUAGCAA GUUC (SEQ. ID. NO: 549)	CACCUAGGGAUCUUGUUAAAAAGCAGAUUCUGAU UCAGGGACCAAGAUUCUGCAUUUUUAGCAAGUUC UCAAGUGAUG (SEQ. ID. NO: 550)

In this specification, a base refers to any one of the nucleotide bases normally found in naturally occurring DNA or RNA. The bases can be purines or pyrimidines. Examples of purine bases include adenine (A) and guanine (G). Examples of pyrimidine bases include thymine (T), cytosine (C) and uracil (U). The adenine can be replaced with 2,6-diaminopurine.

Sequences of nucleic acid molecules disclosed in this specification are shown having uracil bases. Uracil bases occur in RNA molecules. The invention also includes DNA molecules. The sequence of bases of the DNA molecule is the same as the RNA molecule, except that in the DNA molecule, the uracil bases are replaced with thymine bases.

Each base in the sequence can form a Watson-Crick base pair with a complementary base. Watson-Crick base pairs as used herein refer to the hydrogen bonding interaction between, for example, the following bases: adenine and thymine (A-T); adenine and uracil (A-U); and cytosine and guanine (C-G).

Equivalents refer to molecules wherein up to thirty percent of the contiguous bases in, for example, SEQ. ID. NOS:1-94 are wobble bases, and/or up to ten percent, and preferably up to five percent of the contiguous bases are non-complementary.

As used herein, wobble bases refer to either: 1) substitution of a cytosine with a uracil, or 2) the substitution of an adenine with a guanine, in the sequence of the molecule. These wobble base substitutions are generally referred to as UG or GU wobbles. Table B shows the number of contiguous bases and the maximum number of wobble bases in the molecule.

Table B. Number of contiguous Bases and Maximum Number of Wobble Bases

No. of Contiguous Bases	10	11	12	13	14	15	16	17	18
Max. No. of Wobble Base Pairs	3	3	3	3	4	4	4	5	5

No. of Contiguous Bases	19	20	21	22	23
Max. No. of Wobble Base Pairs	5	6	6	6	6

The term "non-complementary" as used herein refers to additions, deletions, mismatches or combinations thereof. Additions refer to the insertion in the contiguous sequence of any base described above. Deletions refer to the removal of any moiety present in the contiguous sequence. Mismatches refer to the substitution of one of the bases in the contiguous sequence with a different base.

The additions, deletions or mismatches can occur anywhere in the contiguous sequence, for example, at either end of the contiguous sequence or within the contiguous sequence of the molecule. Typically, the additions, deletions or mismatches occur at the end of the contiguous sequence if the contiguous sequence is relatively short, such as, for example, from about ten to about fifteen bases in length. If the contiguous sequence is relatively long, such as, for example, a minimum of sixteen contiguous sequences, the additions, deletions, or mismatches may occur anywhere in the contiguous sequence.

For example, none or one of the contiguous bases may be additions, deletions, or mismatches when the number of contiguous bases is ten to nineteen; and none, or one or two additions, deletions, or mismatches are permissible when the number of contiguous bases is twenty or more.

In addition to the at least ten contiguous nucleotides of the microRNA, the isolated DNA or RNA molecule may also have one or more additional nucleotides. There is no upper limit to the additional number of nucleotides. Typically, no more than about 500 nucleotides, and preferably no more than about 300 nucleotides are added to the at least ten contiguous bases of a microRNA.

Any nucleotide can be added. The additional nucleotides can comprise any base described above. Thus, for example, the additional nucleotides may be any one or more of A, G, C, T, or U.

In one embodiment, the microRNA is part of a hairpin precursor sequence or fragment thereof. For example, suitable hairpin precursor sequences are shown in Table A1 as SEQ ID NOs:95-187. Further hairpin precursor sequences are shown in the following: Table A3 as SEQ.

ID. NOs: 375-466; Table A5 as SEQ. ID. NOs: 482-496; Table A7 as SEQ. ID. NOs: 523-548; and Table A8 as SEQ. ID. NO: 550.

The fragment can be any fragment of the hairpin precursor sequence containing at least ten, preferably at least fifteen, more preferably at least twenty nucleotides at the 5' end and/or nucleotides at the 3' end. Preferably the sequence of nucleotides is in the hairpin precursor in which the microRNA is present.

The microRNA or haipin precursor can be inserted into a vector, such as, for example, a recombinant vector. Typically, to construct a recombinant vector containing a microRNA, the hairpin precursor sequence which contains the microRNA sequence is incorporated into the vector. See for example, Chen et al. *Science* 2004, 303:83-86.

The recombinant vector may be any recombinant vector, such as a plasmid, a cosmid or a phage. Recombinant vectors generally have an origin of replication. The vector may be, for example, a viral vector, such as an adenovirus vector or an adeno-associated virus (AAV) vector. See for example: Ledley 1996, *Pharmaceutical Research* 13:1595-1614 and Verma et al. *Nature* 1997, 387:239-242.

The vector may further include a selectable marker. Suitable selectable markers include a drug resistance marker, such as tetracycline or gentamycin, or a detectable gene marker, such as β-galactosidase or luciferase.

In a preferred embodiment, the isolated DNA or RNA molecule consists of any one of the microRNA sequences or a hairpin precursor sequence shown in SEQ ID NOs:1-187.

In another preferred embodiment, the isolated DNA or RNA molecule consists of any one of the microRNA sequences or a hairpin precursor sequence shown in SEQ ID NOs:281-466.

In a further preferred embodiment, the isolated DNA or RNA molecule consists of any one of the microRNA sequences or a hairpin precursor sequence shown in SEQ ID NOs:467-496.

In yet a further preferred embodiment, the isolated DNA or RNA molecule consists of any one of the microRNA sequences or a hairpin precursor sequence shown in SEQ ID NOs:497-548.

In yet a further preferred embodiment, the isolated DNA or RNA molecule consists of any one of the microRNA sequences or a hairpin precursor sequence shown in SEQ ID NOs:549-550.

In this specification, "isolated" means that the molecule is essentially free of other nucleic acids. Essentially free from other nucleic acids means that the molecule is at least about 90%, preferably at least about 95%, and more preferably at least about 98% free of other nucleic acids.

Preferably, the molecule is essentially pure, which means that the molecules are free not only of other nucleic acids, but also of other materials used in the synthesis and isolation of the molecule. Materials used in synthesis include, for example, enzymes. Materials used in isolation include, for example, gels, such as SDS-PAGE. The molecule is at least about 90% free, preferably at least about 95% free and, more preferably at least about 98% free of such materials.

The sequence of bases in a microRNA or hairpin precursor is highly conserved. Due to the high conservation, the sequence can be from a cell of any mammal. Examples of mammals include pet animals, such as dogs and cats, farm animals, such as cows, horses and sheeps, laboratory animals, such as rats, mice and rabbits, and primates, such as monkeys and humans. Preferably, the mammal is human or mouse.

Modified Single Stranded microRNA Molecules

In another embodiment, the invention relates to a modified single stranded microRNA molecule. The modified single stranded microRNA molecule can be any of the microRNA molecules, hairpin precursor molecules, or equivalents thereof described above, except that the modified molecule comprises at least one modified moiety (i.e., at least one moiety is not an unmodified deoxyribonucleotide moiety or an unmodified ribonucleotide moiety). In this embodiment, the modified microRNA molecule comprises a minimum number of ten moieties,

preferably a minimum of thirteen, more preferably a minimum of fifteen, even more preferably a minimum of eighteen, and most preferably a minimum of twenty-one moieties.

The modified microRNA molecules preferably comprise a maximum number of fifty moieties, more preferably a maximum of forty, even more preferably a maximum of thirty, most preferably a maximum of twenty-five, and optimally a maximum of twenty-three moieties. A suitable range of minimum and maximum numbers of moieties may be obtained by combining any of the above minima with any of the above maxima.

Each modified moiety comprises a base bonded to a backbone unit. The backbone unit may be any molecular unit that is able to stably bind to a base and to form an oligomeric chain. In this specification, the backbone units of a modified moiety do not include the backbone units commonly found in naturally occurring DNA or RNA molecules.

Such modified microRNA molecules have increased nuclease resistance. Therefore, the nuclease resistance of the molecule is increased compared to a sequence containing only unmodified ribonucleotide moieties, unmodified deoxyribonucleotide moieties or both. Such modified moieties are well known in the art, and were reviewed, for example, by Kurreck, Eur. J. Biochem. *270*, 1628-1644 (2003).

The nuclease resisted can be an exonuclease, an endonuclease, or both. The exonuclease can be a 3'→5' exonuclease or a 5'→3' exonuclease. Examples of 3'→5' human exonuclease include PNPT1, Werner syndrome helicase, RRP40, RRP41, RRP42, RRP45, and RRP46. Examples of 5'→3' exonuclease include XRN2, and FEN1. Examples of endonucleases include Dicer, Drosha, RNase4, Ribonuclease P, Ribonuclease H1, DHP1, ERCC-1 and OGG1. Examples of nucleases which function as both an exonuclease and an endonuclease include APE1 and EXO1.

A modified moiety can occur at any position in the microRNA molecule. For example, to protect microRNA molecules against 3'→5' exonucleases, the molecules can have at least one modified moiety at the 3' end of the molecule and preferably at least two modified moieties at the 3' end. If it is desirable to protect the molecule against 5'→3' exonuclease, the microRNA molecules can have at least one modified moiety and preferably at least two modified moieties at

the 5' end of the molecule. The microRNA molecules can also have at least one and preferably at least two modified moieties between the 5' and 3' end of the molecule to increase resistance of the molecule to endonucleases. Preferably, at least about 10%, more preferably at least about 25%, even more preferably at least about 50%, and further more preferably at least about 75%, and most preferably at least about 95% of the moieties are modified. In one embodiment, all of the moieties are modified (e.g., nuclease resistant).

In one example of a modified microRNA molecule, the molecule comprises at least one modified deoxyribonucleotide moiety. Suitable modified deoxyribonucleotide moieties are known in the art. Such modified deoxyribonucleotide moieties comprise, for example, phosphorothioate deoxyribose groups as the backbone unit. See structure 1 in figure 1. A modified microRNA molecule comprising phosphorothioate deoxyribonucleotide moieties is generally referred to as phosphorothioate (PS) DNA. See, for example, Eckstein, Antisense Nucleic Acids Drug Dev. *10*, 117-121 (2000).

Another suitable example of a modified deoxyribonucleotide moiety is an N'3-N'5 phosphoroamidate deoxyribonucleotide moiety, which comprises an N'3-N'5 phosphoroamidate deoxyribose group as the backbone unit. See structure 2 in figure 1. An oligonucleotide molecule comprising phosphoroamidate deoxyribonucleotide moieties is generally referred to as phosphoroamidate (NP) DNA. See, for example, Gryaznov *et al.*, J. Am. Chem. Soc. *116*, 3143-3144 (1994).

In another example of a modified microRNA molecule, the molecule comprises at least one modified ribonucleotide moiety. A suitable example of a modified ribonucleotide moiety is a ribonucleotide moiety that is substituted at the 2' position. The substituents at the 2' position may, for example, be a C_1 to C_4 alkyl group. The C_1 to C_4 alkyl group may be saturated or unsaturated, and unbranched or branched. Some examples of C_1 to C_4 alkyl groups include ethyl, isopropyl, and allyl. The preferred C_1 to C_4 alkyl group is methyl. See structure 3 in figure 1. An oligoribonucleotide molecule comprising ribonucleotide moieties substituted at the 2' position with a C_1 to C_4 alkyl group is generally referred to as a 2'-O -(C_1-C_4 alkyl) RNA, e.g., 2'-O-methyl RNA (OMe RNA).

Another suitable example of a substituent at the 2' position of a modified ribonucleotide moiety is a C_1 to C_4 alkoxy - C_1 to C_4 alkyl group. The C_1 to C_4 alkoxy (alkyloxy) and C_1 to C_4 alkyl group may comprise any of the alkyl groups described above. The preferred C_1 to C_4 alkoxy - C_1 to C_4 alkyl group is methoxyethyl. See structure 4 in figure 1. An oligonucleotide molecule comprising more than one ribonucleotide moiety that is substituted at the 2' position with a C1 to C_4 alkoxy-C_1 to C_4 alkyl group is referred to as a 2'-O-(C_1 to C_4 alkoxy - C_1 to C_4 alkyl) RNA, e.g., 2'-O-methoxyethyl RNA (MOE RNA).

Another suitable example of a modified ribonucleotide moiety is a ribonucleotide that has a methylene bridge between the 2'-oxygen atom and the 4'-carbon atom. See structure 5 in figure 1. An oligoribonucleotide molecule comprising ribonucleotide moieties that has a methylene bridge between the 2'-oxygen atom and the 4'-carbon atom is generally referred to as locked nucleic acid (LNA). See, for example, Kurreck *et al.*, Nucleic Acids Res. *30*, 1911-1918 (2002); Elayadi *et al.*, Curr. Opinion Invest. Drugs *2*, 558-561 (2001); Ørum *et al.*, Curr. Opinion Mol. Ther. *3*, 239-243 (2001); Koshkin *et al.*, Tetrahedron *54*, 3607-3630 (1998); Obika *et al.*, Tetrahedron Lett.*39*, 5401-5404 (1998). Locked nucleic acids are commercially available from Proligo (Paris, France and Boulder, Colorado, USA).

Another suitable example of a modified ribonucleotide moiety is a ribonucleotide that is substituted at the 2' position with fluoro group. Such 2'-fluororibonucleotide moieties are known in the art. Molecules comprising 2'-fluororibonucleotide moieties are generally referred to herein as 2'-fluororibo nucleic acids (FANA). See structure 7 in figure 1. Damha *et al.*, J. Am. Chem. Soc. *120*, 12976-12977 (1998).

In another example of a modified microRNA molecule, the molecule comprises at least one modified moiety comprising a base bonded to an amino acid residue as the backbone unit. Modified moieties that have at least one base bonded to an amino acid residue will be referred to herein as peptide nucleic acid (PNA) moieties. Such moieties are nuclease resistance, and are known in the art. Molecules having PNA moieties are generally referred to as peptide nucleic acids. See structure 6 in figure 1. Nielson, Methods Enzymol. *313*, 156-164 (1999); Elayadi, *et al*, *id.*; Braasch *et al.*, Biochemistry *41*, 4503-4509 (2002), Nielsen *et al.*, Science *254*, 1497-1500 (1991).

The amino acids can be any amino acid, including natural or non-natural amino acids. Naturally occurring amino acids include, for example, the twenty most common amino acids normally found in proteins, i.e., alanine (Ala), arginine (Arg), asparagine (Asn), aspartic acid (Asp), cysteine (Cys), glutamine (Glu), glutamic acid (Glu), glycine (Gly), histidine (His), isoleucine (Ileu), leucine (Leu), lysine (Lys), methionine (Met), phenylalanine (Phe), proline (Pro), serine (Ser), threonine (Thr), tryptophan, (Trp), tyrosine (Tyr), and valine (Val).

The non-natural amino acids may, for example, comprise alkyl, aryl, or alkylaryl groups. Some examples of alkyl amino acids include α-aminobutyric acid, β-aminobutyric acid, γ-aminobutyric acid, δ-aminovaleric acid, and ε-aminocaproic acid. Some examples of aryl amino acids include ortho-, meta, and para-aminobenzoic acid. Some examples of alkylaryl amino acids include ortho-, meta-, and para-aminophenylacetic acid, and γ-phenyl-β-aminobutyric acid.

Non-naturally occurring amino acids also include derivatives of naturally occurring amino acids. The derivative of a naturally occurring amino acid may, for example, include the addition or one or more chemical groups to the naturally occurring amino acid.

For example, one or more chemical groups can be added to one or more of the 2', 3', 4', 5', or 6' position of the aromatic ring of a phenylalanine or tyrosine residue, or the 4', 5', 6', or 7' position of the benzo ring of a tryptophan residue. The group can be any chemical group that can be added to an aromatic ring. Some examples of such groups include hydroxyl, C_1-C_4 alkoxy, amino, methylamino, dimethylamino, nitro, halo (i.e., fluoro, chloro, bromo, or iodo), or branched or unbranched C_1-C_4 alkyl, such as methyl, ethyl, n-propyl, isopropyl, butyl, isobutyl, or t-butyl.

Other examples of non-naturally occurring amino acids which are derivatives of naturally occurring amino acids include norvaline (Nva), norleucine (Nle), and hydroxyproline (Hyp).

The amino acids can be identical or different from one another. Bases are attached to the amino acid unit by molecular linkages. Examples of linkages are methylene carbonyl, ethylene carbonyl and ethyl linkages. (Nielsen et al., *Peptide Nucleic Acids-Protocols and Applications*, Horizon Scientific Press, pages 1-19; Nielsen et al., *Science* 254: 1497-1500.) One example of an amino acid residue of a PNA moiety is N-(2-aminoethyl)-glycine.

Further examples of PNA moieties include cyclohexyl PNA, retro-inverso PNA, phosphone PNA, propionyl PNA and aminoproline PNA moieties. For a description of these PNA moieties, see Figure 5 of Nielsen et al., *Peptide Nucleic Acids-Protocols and Applications*, Horizon Scientific Press, pages 1-19. Figure 5 on page 7 of Nielsen et al. is hereby incorporated by reference.

PNA can be chemically synthesized by methods known in the art, e.g. by modified Fmoc or tBoc peptide synthesis protocols. The PNA has many desirable properties, including high melting temperatures (Tm), high base-pairing specificity with nucleic acid and an uncharged molecular backbone. Additionally, the PNA does not confer RNase H sensitivity on the target RNA, and generally has good metabolic stability.

Peptide nucleic acids are also commercially available from Applied Biosystems (Foster City, California, USA).

In another example of a modified microRNA molecule, the molecule comprises at least one morpholino phosphoroamidate nucleotide moiety. Molecules comprising morpholino phosphoroamidate nucleotide moieties are generally referred to as morpholino (MF) nucleic acids. See structure 8 in figure 1. Heasman, Dev. Biol. *243*, 209-214 (2002). Morpholino oligonucleotides are commercially available from Gene Tools LLC (Corvallis, Oregon, USA).

In a further example of a modified microRNA molecule, the molecule comprises at least one cyclohexene nucleotide moiety. Molecules comprising cyclohexene nucleotide moieties are generally referred to as cyclohexene nucleic acids (CeNA). See structure 10 in figure 1. Wang *et al.*, J. Am. Chem. Soc. *122*, 8595-8602 (2000), Verbeure *et al.*, Nucleic Acids Res. *29*, 4941-4947 (2001).

In a final example of a modified microRNA molecule, the molecule comprises at least one tricyclo nucleotide moiety. Molecules comprising tricyclo nucleotide moieties are generally referred to as tricyclo nucleic acids (tcDNA). See structure 9 in figure 1. Steffens *et al.*, J. Am. Chem. Soc. *119*, 11548-11549 (1997), Renneberg *et al.*, J. Am. Chem. Soc. *124*, 5993-6002 (2002).

The molecule can be a chimeric modified microRNA molecule. Chimeric molecules containing a mixture of any of the moieties mentioned above are also known, and may be made by methods known, in the art. See, for example, references cited above, and Wang *et al*, Proc. Natl. Acad. Sci. USA *96*, 13989-13994 (1999), Liang *et al*., Eur. J. Biochem. *269*, 5753-5758 (2002), Lok *et al*., Biochemistry *41*, 3457-3467 (2002), and Damha *et al*., J. Am. Chem. Soc. *120*, 12976-12977 (2002).

The modified microRNA molecules of the invention comprise at least ten, preferably at least thirteen, more preferably at least fifteen, and even more preferably at least twenty contiguous bases having any of the contiguous base sequences of a naturally occurring microRNA molecule shown in SEQ ID NOs:1-94, SEQ. ID. NOs: 281-374, SEQ. ID NOs:467-481, SEQ. ID. NOs:497-522, or SEQ. ID. NO:549; except that the modified molecule comprises at least one modified moiety. In a preferred embodiment, the modified microRNA molecules comprise the entire sequence of any of the microRNA molecule shown in SEQ ID NOs:1-94, SEQ. ID. NOs: 281-374, SEQ. ID. NOs:467-481, SEQ. ID. NOs:497-522, or SEQ. ID. NO:549.

Any number of additional moieties, up to a maximum of forty moieties, having any base sequence can be added to the moieties comprising the contiguous base sequence, as long as the total number of moieties in the molecule does not exceed fifty. The additional moieties can be added to the 5' end, the 3' end, or to both ends of the contiguous sequence. The additional moieties can include a sequence of bases at the 5' end and/or a sequence of bases at the 3' end present in the hairpin precursor from which the microRNA is present or any fragment thereof. The additional moieties in the molecule, if any, can be any modified or unmodified moiety described above.

The modified microRNA molecules include equivalents thereof. Equivalents include wobble bases and non-complementary bases as described above.

Further, no more than fifty percent, and preferably no more than thirty percent, of the contiguous moieties contain deoxyribonucleotide backbone units. For example, Table C and D show maximum numbers of deoxyribonucleotide backbone units for 19-23 contiguous bases.

In another embodiment, in addition to the wobble base pairs and non-complementary bases described above, the moiety corresponding to position 11 in a naturally occurring microRNA sequence can be an addition, deletion or mismatch.

The modified microRNA molecule is preferably isolated, more preferably purified, as defined above.

Table C. Fifty Percent of the Contiguous Moieties containing Deoxyribonucleotide Backbone Units

No. of Contiguous Bases	10	11	12	13	14	15	16	17	18
Max. No. of Deoxyribonucleotide Backbone Units	5	5	6	6	7	7	8	8	9

No. of Contiguous Bases	19	20	21	22	23
Max. No. of Deoxyribonucleotide Backbone Units	9	10	10	11	11

Table D. Thirty Percent of the Contiguous Moieties Containing Deoxyribonucleotide Backbone Units

No. of Contiguous Bases	10	11	12	13	14	15	16	17	18
Max. No. of Deoxyribonucleotide Backbone Units	3	3	3	3	4	4	4	5	5

No. of Contiguous Bases	19	20	21	22	23

Max. No. of Deoxyribonucleotide Backbone Units	5	6	6	6	6

In yet another embodiment, caps can be attached to one end, to both ends, and/or between the ends of the molecule in order to increase resistance to nucleases of the modified microRNA molecules or isolated DNA or RNA molecules of the present invention described above. Increasing resistance to, for example, exonucleases and/or endonucleases is desirable. Any cap known to those in the art for increasing nuclease resistance can be employed.

Examples of such caps include inverted nucleotide caps and chemical caps. Inverted nucleotide caps can be attached at the 5' and/or 3' end. Chemical caps can be attached to one end, both ends, and/or between the ends of the molecule.

An inverted nucleotide cap refers to a 3'→5' sequence of nucleic acids attached to the modified microRNA molecule or DNA or RNA molecules at the 5' and/or the 3' end. There is no limit to the maximum number of nucleotides in the inverted cap just as long as it does not interfere with binding of the microRNA molecule or isolated DNA or RNA molecule to its target mRNA. Any nucleotide can be used in the inverted nucleotide cap. Usually, the nucleotide cap is less than about forty nucleotides in length, preferably less than about thirty nucleotides in length, more preferably less than about twenty nucleotides in length, and even more preferably less than about ten nucleotides in length. Typically, the inverted nucleotide cap is one nucleotide in length. The nucleotide for the inverted cap is generally thymine, but can be any nucleotide such as adenine, guanine, uracil, or cytosine.

A chemical cap refers to any chemical group known to those in the art for increasing nuclease resistance of nucleic acids. Examples of such chemical caps include hydroxyalkyl groups (alkyl hydroxides) or aminoalkyl groups (alkyl amines). Hydroxyalkyl groups are sometimes referred to as alkyl glycoyl groups (e.g., ethylene glycol). Aminoalkyl groups are sometimes referred to as amino linkers.

The alkyl chain in the hydroxyalkyl group or aminoalkyl groups can be a straight chain or branched chain. The minimum number of carbon atoms present in the alkyl chain is one, preferably at least two, and more preferably at least about three carbon atoms.

The maximum number of carbon atoms present in the alkyl chain is about eighteen, preferably about sixteen, and more preferably about twelve. Typical alkyl groups include

methyl, ethyl, and propyl. The alkyl groups can be further substituted with one or more hydroxyl and/or amino groups.

Some examples of amino linkers are shown in Table E. The amino linkers listed in Table E are commercially available from TriLink Biotechnologies, San Diego, CA.

Isolated MicroRNP

In another aspect, the invention provides an isolated microRNP comprising any of the isolated DNA or RNA molecules described above or modified microRNA molecules described above. The isolated DNA or RNA molecules or modified microRNA molecules described above in the microRNP can be bound to a protein.

Examples of such proteins include those proteins belonging to the Ago family. Examples of proteins of the Ago family include Ago 1, 2, 3, and 4. Typically, the Ago 2 protein and microRNA complex guides target mRNA cleavage in RNAi, while Ago 1, 3 and 4 represses translation of target mRNAs.

Anti- MicroRNA Molecules

In another aspect, the invention provides an anti-microRNA molecule. The anti-microRNA molecule may be any of the isolated DNA or RNA molecules described above or modified microRNA molecules described above, except that the sequence of bases of the anti-microRNA molecule is complementary to the sequence of bases in an isolated DNA or RNA molecule or modified microRNA molecule.

Examples of sequences of anti-microRNA molecules are shown in Tables F, F1, F2, F3 and F4.

Table E. Amino Linkers from TriLink Biotechnologies

2'-Deoxycytidine-5-C6 Amino Linker (3' Terminus)
2'-Deoxycytidine-5-C6 Amino Linker (5' or Internal)
3' C3 Amino Linker
3' C6 Amino Linker
3' C7 Amino Linker
5' C12 Amino Linker
5' C3 Amino Linker
5' C6 Amino Linker
C7 Internal Amino Linker
Thymidine-5-C2 Amino Linker (5' or Internal)
Thymidine-5-C6 Amino Linker (3' Terminus)
Thymidine-5-C6 Amino Linker (Internal)

Table F. Anti-microRNA Sequences for microRNAs in Table A

MicroRNA	Anti-microRNA Sequence (5' → 3')
miR-18b-5p	CUAACUGCACUAGAUGCACCUUA (SEQ.ID.NO: 188)
miR-20b-3p	CUGGAAGUGCCCAUACUACAGU (SEQ.ID.NO: 189)
miR-20b-5p	CUACCUGCACUAUGAGCACUUUG (SEQ.ID.NO: 190)
miR-301b	UGCUUUGACAAUAUCAUUGCACUG (SEQ.ID.NO: 191)
miR-329	AAAGAGGUUAACCAGGUGUGUU (SEQ.ID.NO: 192)
miR-374b	CACUUAGCAGGUUGUAUUAUAU (SEQ.ID.NO: 193)
miR-421	CGCCCAAUUAAUGUCUGUUGAU (SEQ.ID.NO: 194)
miR-500	ACCCUAUAAGCAAUAUUGCACUA (SEQ.ID.NO: 195)
miR-504	GCAAUGCAACAGCAAUGCAC (SEQ.ID.NO: 196)
miR-604	UGCUGUUAGCCCUAGCCCCGCA (SEQ.ID.NO: 197)
miR-610	ACGGUCCUACACUCAAGGCAUG (SEQ.ID.NO: 198)
miR-618	ACGCUUUGUCAGUACAUAUUAA (SEQ.ID.NO: 199)
miR-619	ACACACCCACGCGAGCCGGAAA (SEQ.ID.NO: 200)
miR-620	CCAACCUGCCCGCUCCCAACAU (SEQ.ID.NO: 201)
miR-631	AAGAGGGAGACCCAGGCUCGGA (SEQ.ID.NO: 202)
miR-720a	ACCAGCUAACAAUACACUGCCA (SEQ.ID.NO: 203)
miR-720b	GCCAGCUAACAAUACACUGCCU (SEQ.ID.NO: 204)
miR-723-3p	CCAGCACCACAUCAGGCCCACG (SEQ.ID.NO: 205)
miR-723-5p	UGUGGCCCUGACACGUGGUACU (SEQ.ID.NO: 206)
miR-730	AAGAAGUGCACCGCGAAUGUUU (SEQ.ID.NO: 207)
miR-732	GGGACCGACAGCAGAAUCCUUU (SEQ.ID.NO: 208)
miR-734	ACGGUUUUACCAGACAGUAUUA (SEQ.ID.NO: 209)
miR-755	UCACAUUUGCCUGCAGAGAUUU (SEQ.ID.NO: 210)
miR-800a	AAGUGGAUGACCCUGUACGAUU (SEQ.ID.NO: 211)
miR-800b	AACUGGAUGUCCCUGUAUGAUU (SEQ.ID.NO: 212)
miR-803	CGAUGUAGUCCAAAGGCACAUA (SEQ.ID.NO: 213)
miR-805	AUAUUAGGAACACAUCGCAAAA (SEQ.ID.NO: 214)
miR-806	ACUCAGUAAUGGUAACGGUUU (SEQ.ID.NO: 215)
miR-809	ACACCGAGGAGCCCAUCAUGAU (SEQ.ID.NO: 216)
miR-810	CUGCAUGACGGCCUGCAAGACA (SEQ.ID.NO: 217)
miR-811	GUCUCAGUUUCCUCUGCAAACA (SEQ.ID.NO: 218)
miR-812	GCGAACUCACCACGGACAACCU (SEQ.ID.NO: 219)
miR-814	GGAGACUCACAAGUUCCUGC (SEQ.ID.NO: 220)
miR-815	GCACAACCCUAGUGGCGCCAUU (SEQ.ID.NO: 221)
miR-816	CACUCAGCGGCCGUUUCCCCAA (SEQ.ID.NO: 222)
miR-817	GCUGAGCGGUGAGGGCAUACAG (SEQ.ID.NO: 223)
miR-818	AGGACUAUAGAACUUUCCCCCU (SEQ.ID.NO: 224)
miR-819	AGAGGCAGGGUAGUGUAAUGGA (SEQ.ID.NO: 225)
miR-821	CAGCAGCCUCCGCCGCCGCCGC (SEQ.ID.NO: 226)
miR-822	UAGCAGAAGCAUUUCCGCACAC (SEQ.ID.NO: 227)

MicroRNA	Anti-microRNA Sequence (5' → 3')
miR-824	ACACACCAAGGAUAAUUUCUCC (SEQ.ID.NO: 228)
miR-825-3p	UUCAGUUAUCAAUCUGUCACAA (SEQ.ID.NO: 229)
miR-825-5p	CUCGUGACAUGAUGAUCCCCGA (SEQ.ID.NO: 230)
miR-826	CUCUACUCACAGAAGUGUCAAU (SEQ.ID.NO: 231)
miR-828-3p	UUCGACUGCCACUCUUACUAGA (SEQ.ID.NO: 232)
miR-828-5p	CCUCUAGUAAAUAUGUCAGCAU (SEQ.ID.NO: 233)
miR-829-5p	CUGCACUUUUAUGAAUAAGCUC (SEQ.ID.NO: 234)
miR-829-3p	GACUAGCUUAUACAUAAAAUUA (SEQ.ID.NO: 235)
miR-831	GGCCUCCGGAAGCUCCGCCCCA (SEQ.ID.NO: 236)
miR-832	UGACCCACCUGGAGAUCCAUGG (SEQ.ID.NO: 237)
miR-834	CCUGGCACACAGUAGACCUUCA (SEQ.ID.NO: 238)
miR-835-5p	UCCAGCCCCUCCAGGGCUUCCU (SEQ.ID.NO: 239)
miR-835-3p	AGGUGGAGCCCUGAGAACCGGA (SEQ.ID.NO: 240)
miR-837	UGAGGGGCCUCAGCCUCCUGGU (SEQ.ID.NO: 241)
miR-838	AUCGGGAGGGGACUGAGCCUGA (SEQ.ID.NO: 242)
miR-839-5p	UCGGGGCAGCUCAGUACAGGA (SEQ.ID.NO: 243)
miR-839-3p	AUCCUGUACUGAGCUGCCCCG (SEQ.ID.NO: 244)
miR-840-3p	CCACGACCGACGCCACGCCGAG (SEQ.ID.NO: 245)
miR-840-5p	AGCCGGUCGAGGUCCGGUCGA (SEQ.ID.NO: 246)
miR-841	GACCAAGAAAUAGCCUUUCAAA (SEQ.ID.NO: 247)
miR-842	GCAAAGGUAAUUGCUGUUUUCG (SEQ.ID.NO: 248)
miR-843	CUAGAAGCUCACAGUCUAGUUG (SEQ.ID.NO: 249)
miR-845	UGCGCCACUGGAGCAUGCUUU (SEQ.ID.NO: 250)
miR-846	GCUCCCCACAGACCCAGAGCCG (SEQ.ID.NO: 251)
miR-847	CCCGCCAUAGUGGUCCUCUCUG (SEQ.ID.NO: 252)
miR-848	CUGGUCCAUAGGGGAUGGCAAU (SEQ.ID.NO: 253)
miR-849	CCAGUGUCUCCAGUAGUAGACA (SEQ.ID.NO: 254)
miR-850	GGAGAUGGAGCCAGGGCCCUAA (SEQ.ID.NO: 255)
miR-851	CCUCGGGAUGGCGCCCGUUCAC (SEQ.ID.NO: 255)
miR-852	GCACACAAUAAAUGUUUGCUGA (SEQ.ID.NO: 256)
miR-853	AACCAAGACCCCGGAGAUCCCA (SEQ.ID.NO: 257)
miR-854	UCGGUCCCUCGGGCCAGGGCAG (SEQ.ID.NO: 258)
miR-855-3p	UGUGGGUGUGUGCAUGAGCGUG (SEQ.ID.NO: 259)
miR-855-5p	CACACUCACACACACACACUCA (SEQ.ID.NO: 260)
miR-857	CGGGGAGCGGGGGCCCUGCCUU (SEQ.ID.NO: 261)
miR-864	CCCUCUCAACUCAGCUUUU (SEQ.ID.NO: 262)
miR-867	GUCUAGACUGUGAGCUCCUCGA (SEQ.ID.NO: 263)
miR-869	GCACAUGUUCUGCGGCCCACCA (SEQ.ID.NO: 264)
miR-871-3p	CAGCACAGAGAUGGACAGAUAG (SEQ.ID.NO: 265)
miR-871-5p	CCGCUUGAGCUAACUCCGACCCG (SEQ.ID.NO: 266)
miR-92b	GGAGGCCGGGACGAGUGCAAUA (SEQ.ID.NO: 267)
miR-896	GCUGCCGUAUAUGUGAUGUCAC (SEQ.ID.NO: 268)
miR-883	GAGGUUUCCCGUGUAUGUUUCA (SEQ.ID.NO: 269)

MicroRNA	Anti-microRNA Sequence (5' → 3')
miR-884	GAACUUGCUAAAAAUGCAGAAU (SEQ.ID.NO: 270)
miR-885	ACUGAAACCAAGUAUGGGUCGC (SEQ.ID.NO: 271)
miR-886	AGCACAGACUUGCUGUGAUGUU (SEQ.ID.NO: 272)
miR-887	CACCUGAUAAAACUGAGGUAUA (SEQ.ID.NO: 273)
miR-888	ACACAACCUCAGUGUUUCCAGG (SEQ.ID.NO: 274)
miR-889	GAUAGAGUGCAGACCAGGGUCU (SEQ.ID.NO: 275)
miR-890	CCUCAUGGAAGGGUUCCCCACU (SEQ.ID.NO: 276)
miR-891	UCAGUAGAGAUUGUUUCAACAC (SEQ.ID.NO: 277)
miR-892	GGUGAUUCACAAAGAAAUCCAU (SEQ.ID.NO: 278)
miR-893	ACAGCCGCCGCCGCCGCCGCCG (SEQ.ID.NO: 279)
miR-894	UUCCCUUCUUUCCUCCCGUCUU (SEQ.ID.NO: 280)

Table F1. Anti-microRNA sequences for microRNAs in Table A2

MicroRNA	Anti-microRNA Sequence (5' → 3')
hsa-miR-100516	UGACUGACAGCUUUUUGAGUA (SEQ. ID. NO: 551)
hsa-miR-100604	UGCUGUUAGCCCUAGCCCCGCA (SEQ. ID. NO: 552)
hsa-miR-100610-5p	ACGGUCCUACACUCAAGGCAUG (SEQ. ID. NO: 553)
hsa-miR-100631	AAGAGGGAGACCCAGGCUCGGA (SEQ. ID. NO: 554)
hsa-miR-100701	CCUGAACUAACAAGUAACCUU (SEQ. ID. NO: 555)
hsa-miR-100723	CCAGCACCACAUCAGGCCCACG (SEQ. ID. NO: 556)
hsa-miR-100730	AAGAAGUGCACCGCGAAUGUUU (SEQ. ID. NO: 557)
hsa-miR-100732	GGGACCGACAGCAGAAUCCUU (SEQ. ID. NO: 558)
hsa-miR-100754	AACCCAAUAUCAAACAUAUCA (SEQ. ID. NO: 559)
hsa-miR-100760	UACACCACUCCCAUCUCAGUGC (SEQ. ID. NO: 560)
hsa-miR-100814	AGGAGACUCACAAGUUCCUGC (SEQ. ID. NO: 561)
hsa-miR-100815	ACACAACCCUAGUGGCGCCAUU (SEQ. ID. NO: 562)
hsa-miR-100818	GGACUAUAGAACUUUCCCCCU (SEQ. ID. NO: 563)
hsa-miR-100819	AGAGGCAGGGUAGUGUAAUGGA (SEQ. ID. NO: 564)
hsa-miR-100824	ACACACCAAGGAUAAUUUCUCC (SEQ. ID. NO: 565)
hsa-miR-100825-3p	UUUCAGUUAUCAAUCUGUCACA (SEQ. ID. NO: 566)
hsa-miR-100825-5p	UCUCGUGACAUGAUGAUCCCCGA (SEQ. ID. NO: 567)
hsa-miR-100829-3p	ACUAGCUUAUACAUAAAAUUA (SEQ. ID. NO: 568)
hsa-miR-100835-5p	CUCCAGCCCCUCCAGGGCUUCCU (SEQ. ID. NO: 569)
hsa-miR-100842	GCAAAGGUAAUUGCUGUUUUCG (SEQ. ID. NO: 570)
hsa-miR-100843-3p	CUAGAAGCUCACAGUCUAGUUG (SEQ. ID. NO: 571)

MicroRNA	Anti-microRNA Sequence (5' → 3')
hsa-miR-100843-5p	CCCAGCUAGAUUGUAAGCUCCUU (SEQ. ID. NO: 572)
hsa-miR-100846	CUCCCCACAGACCCAGAGCCG (SEQ. ID. NO: 573)
hsa-miR-100851	CCUCGGGAUGGCGCCCGUUCAC (SEQ. ID. NO: 574)
hsa-miR-100852	GCACACAAUAAAUGUUUGCUGA (SEQ. ID. NO: 575)
hsa-miR-100854	UCGGUCCCUCGGGCCAGGGCAG (SEQ. ID. NO: 576)
hsa-miR-100855-3p	UGUGGGUGUGUGCAUGAGCGUG (SEQ. ID. NO: 577)
hsa-miR-100855-5p	ACACACUCACACACACACACUCA (SEQ. ID. NO: 578)
hsa-miR-100869-3p	AAGGUGAUGGUCAGCAGACAUA (SEQ. ID. NO: 579)
hsa-miR-100869-5p	GCACAUGUUCUGCGGCCCACCA (SEQ. ID. NO: 580)
hsa-miR-100871-3p	AAGGGUCAGUAAGCACCCGCG (SEQ. ID. NO: 581)
hsa-miR-100871-5p	CCGCUUGAGCUAACUCCGACCCG (SEQ. ID. NO: 582)
hsa-miR-100885	CUGAAACCAAGUAUGGGUCGC (SEQ. ID. NO: 583)
hsa-miR-100887-3p	ACACAACCUCAGUGUUUCCAGG (SEQ. ID. NO: 584)
hsa-miR-100887-5p	CACCUGAUAAAACUGAGGUAUA (SEQ. ID. NO: 585)
hsa-miR-100891-3p	UGAAUUACUUUGUAAACCACCA (SEQ. ID. NO: 586)
hsa-miR-100891-5p	UGGUGAUUCACAAAGAAAUCCA (SEQ. ID. NO: 587)
hsa-miR-101001	AGGGGCCUCAGCCUCCUGGU (SEQ. ID. NO: 588)
hsa-miR-146b	AGCCUAUGGAAUUCAGUUCUCA (SEQ. ID. NO: 589)
hsa-miR-147b	UAGCAGAAGCAUUUCCGCACAC (SEQ. ID. NO: 590)
hsa-miR-181d	ACCCACCGACAACAAUGAAUGUU (SEQ. ID. NO: 591)
hsa-miR-18b	CUAACUGCACUAGAUGCACCUUA (SEQ. ID. NO: 592)
hsa-miR-193b	AGCGGGACUUUGAGGGCCAGUU (SEQ. ID. NO: 593)
hsa-miR-200001	UCAGUGGCUCAGGUUCGUUGCA (SEQ. ID. NO: 594)
hsa-miR-200002	AAAGAGGUUAACCAUGUAUUAU (SEQ. ID. NO: 595)
hsa-miR-200003	CAACUGAUGCCUUUCCAAGUA (SEQ. ID. NO: 596)
hsa-miR-200004	UCAAUGACUCAGGUAAGUUGCA (SEQ. ID. NO: 597)
hsa-miR-200007	CCCUGCGCCAUCUCCUCUAC (SEQ. ID. NO: 598)
hsa-miR-200008	AACUCCGAUAUGCAAUGGGUA (SEQ. ID. NO: 599)
hsa-miR-20b	CUACCUGCACUAUGAGCACUUUG (SEQ. ID. NO: 600)
hsa-miR-20b-3p	CUGGAAGUGCCCAUACUACAGU (SEQ. ID. NO: 601)
hsa-miR-216b	UCACAUUUGCCUGCAGAGAUUU (SEQ. ID. NO: 602)
hsa-miR-301b	UGCUUUGACAAUAUCAUUGCACUG (SEQ. ID. NO: 603)
hsa-miR-329	AAAGAGGUUAACCAGGUGUGUU (SEQ. ID. NO: 604)
hsa-miR-33b	GCAAUGCAACAGCAAUGCAC (SEQ. ID. NO: 605)
hsa-miR-374b	CACUUAGCAGGUUGUAUUAUAU (SEQ. ID. NO: 606)
hsa-miR-375	UCACGCGAGCCGAACGAACAAA (SEQ. ID. NO: 607)
hsa-miR-376a	ACGUGGAUUUUCCUCUAUGAU (SEQ. ID. NO: 608)
hsa-miR-376b	AACAUGGAUUUUCCUCUAUGAU (SEQ. ID. NO: 609)

MicroRNA	Anti-microRNA Sequence (5' → 3')
hsa-miR-376c	AAGUGGAUGACCCUGUACGAUU (SEQ. ID. NO: 610)
hsa-miR-376c	AAGUGGAUGACCCUGUACGAUU (SEQ. ID. NO: 611)
hsa-miR-377	ACAAAAGUUGCCUUUGUGUGAU (SEQ. ID. NO: 612)
hsa-miR-378	CCUUCUGACUCCAAGUCCAGU (SEQ. ID. NO: 613)
hsa-miR-379	CCUACGUUCCAUAGUCUACCA (SEQ. ID. NO: 614)
hsa-miR-380	AAGAUGUGGACCAUAUUACAUA (SEQ. ID. NO: 615)
hsa-miR-410	ACAGGCCAUCUGUGUUAUAUU (SEQ. ID. NO: 616)
hsa-miR-421-3p	CGCCCAAUUAAUGUCUGUUGAU (SEQ. ID. NO: 617)
hsa-miR-429	ACGGUUUUACCAGACAGUAUUA (SEQ. ID. NO: 618)
hsa-miR-431	UGCAUGACGGCCUGCAAGACA (SEQ. ID. NO: 619)
hsa-miR-432	CCACCCAAUGACCUACUCCAAGA (SEQ. ID. NO: 620)
hsa-miR-433	ACACCGAGGAGCCCAUCAUGAU (SEQ. ID. NO: 621)
hsa-miR-449a	ACCAGCUAACAAUACACUGCCA (SEQ. ID. NO: 622)
hsa-miR-449b	GCCAGCUAACAAUACACUGCCU (SEQ. ID. NO: 623)
hsa-miR-450a	AUAUUAGGAACACAUCGCAAAA (SEQ. ID. NO: 624)
hsa-miR-451	AACUCAGUAAUGGUAACGGUUU (SEQ. ID. NO: 625)
hsa-miR-452	UCAGUUUCCUCUGCAAACAGUU (SEQ. ID. NO: 626)
hsa-miR-453	UGCGAACUCACCACGGACAACCU (SEQ. ID. NO: 627)
hsa-miR-454	ACCCUAUAAGCAAUAUUGCACUA (SEQ. ID. NO: 628)
hsa-miR-455-5p	CGAUGUAGUCCAAAGGCACAUA (SEQ. ID. NO: 629)
hsa-miR-484	AUCGGGAGGGGACUGAGCCUGA (SEQ. ID. NO: 630)
hsa-miR-485-3p	AGAGAGGAGAGCCGUGUAUGAC (SEQ. ID. NO: 631)
hsa-miR-485-5p	GAAUUCAUCACGGCCAGCCUCU (SEQ. ID. NO: 632)
hsa-mir-486__os	AUCCUGUACUGAGCUGCCCCG (SEQ. ID. NO: 633)
hsa-miR-487	AACUGGAUGUCCCUGUAUGAUU (SEQ. ID. NO: 634)
hsa-miR-488	AGACCAAGAAAUAGCCUUUCAA (SEQ. ID. NO: 635)
hsa-miR-490	ACCCACCUGGAGAUCCAUGG (SEQ. ID. NO: 636)
hsa-miR-493	CCUGGCACACAGUAGACCUUCA (SEQ. ID. NO: 637)
hsa-miR-497	ACAAACCACAGUGUGCUGCUG (SEQ. ID. NO: 638)
hsa-miR-502	UGAAUCCUUGCCCAGGUGCAUU (SEQ. ID. NO: 639)
hsa-miR-503	CUGCAGAACUGUUCCCGCUGCUA (SEQ. ID. NO: 640)
hsa-miR-505	AGGAAACCAGCAAGUGUUGACG (SEQ. ID. NO: 641)
hsa-miR-509-3p	CUACCCACAGACGUACCAAUCA (SEQ. ID. NO: 642)
hsa-miR-514	UCUACUCACAGAAGUGUCAAU (SEQ. ID. NO: 643)
hsa-miR-92b	GAGGCCGGGACGAGUGCAAUA (SEQ. ID. NO: 644)

Table F2. Anti-microRNA sequences for microRNAs in Table A4

MicroRNA	Anti-microRNA Sequence (5' → 3')
hsa-miR-100516	UGACUGACAGCUUUUUGAGUA (SEQ. ID. NO: 645)
hsa-miR-100701	CCUGAACUAACAAGUAACCUU (SEQ. ID. NO: 646)
hsa-miR-100760	UACACCACUCCCAUCUCAGUGC (SEQ. ID. NO: 647)
hsa-miR-100885	CUGAAACCAAGUAUGGGUCGC (SEQ. ID. NO: 648)
hsa-miR-100887-3p	ACACAACCUCAGUGUUUCCAGG (SEQ. ID. NO: 649)
hsa-miR-100887-5p	CACCUGAUAAAACUGAGGUAUA (SEQ. ID. NO: 650)

MicroRNA	Anti-microRNA Sequence (5' → 3')
hsa-miR-100891-3p	UGAAUUACUUUGUAAACCACCA (SEQ. ID. NO: 651)
hsa-miR-100891-5p	UGGUGAUUCACAAAGAAAUCCA (SEQ. ID. NO: 652)
hsa-miR-200001	UCAGUGGCUCAGGUUCGUUGCA (SEQ. ID. NO: 653)
hsa-miR-200002	AAAGAGGUUAACCAUGUAUUAU (SEQ. ID. NO: 654)
hsa-miR-200003	CAACUGAUGCCUUUCCAAGUA (SEQ. ID. NO: 655)
hsa-miR-200004	UCAAUGACUCAGGUAAGUUGCA (SEQ. ID. NO: 656)
hsa-miR-200007	CCCUGCGCCAUCUCCUCUAC (SEQ. ID. NO: 657)
hsa-miR-200008	AACUCCGAUAUGCAAUGGGUA (SEQ. ID. NO: 658)
hsa-mir-486_os	UCCUGUACUGAGCUGCCCCG (SEQ. ID. NO: 659)

Table F3. Anti-microRNA sequences for microRNAs in Table A6

MicroRNA	Anti-microRNA Sequence (5' → 3')
hsa-mir-18b-3p	GCCAGAAGGGGCAUUUAGGGCAG (SEQ. ID. NO: 660)
hsa-miR-618	ACGCUUUGUCAGUACAUAUUAA (SEQ. ID. NO: 661)
hsa-miR-619	ACACACCCACGCGAGCCGGAAA (SEQ. ID. NO: 662)
hsa-miR-620	CCAACCUGCCCGCUCCCAACAU (SEQ. ID. NO: 663)
hsa-miR-723-5p	UCAUGUGGCCCUGACACGUGGUACU (SEQ. ID. NO: 664)
hsa-mir-816	UCACUCAGCGGCCGUUUCCCCAA (SEQ. ID. NO: 665)
hsa-mir-817	GCUGAGCGGUGAGGGCAUACAG (SEQ. ID. NO: 666)
hsa-mir-821-1	AGCCUCCGCCGCCGCCGC (SEQ. ID. NO: 667)
hsa-mir-821-2/3	AGCCUCCGCCGCCGCCGC (SEQ. ID. NO: 668)
hsa-mir-828-3p	UCGACUGCCACUCUUACUAGA (SEQ. ID. NO: 669)
hsa-mir-828-5p	CCUCUAGUAAAUAUGUCAGCAU (SEQ. ID. NO: 670)
hsa-mir-831-1	GGCCUCCGGAAGCUCCGCCCCA (SEQ. ID. NO: 671)
hsa-mir-831-2	GGCCUCCGGAAGCUCCGCCCCA (SEQ. ID. NO: 672)
hsa-mir-831-3/-4/-5	GGCCUCCGGAAGCUCCGCCCCA (SEQ. ID. NO: 673)
hsa-mir-840-3p	CCACGACCGACGCCACGCCGAGU (SEQ. ID. NO: 674)
hsa-mir-840-5p	GAGCCGGUCGAGGUCCGGUCGA (SEQ. ID. NO: 675)
hsa-mir-845-1	GCGCCACUGGAGCAUGCUUU (SEQ. ID. NO: 676)
hsa-mir-845-2	GCGCCACUGGAGCAUGCUUU (SEQ. ID. NO: 677)
hsa-mir-847	CCCGCCAUAGUGGUCCUCUCUG (SEQ. ID. NO: 678)
hsa-mir-848	CUGGUCCAUAGGGGAUGGCAAU (SEQ. ID. NO: 679)
hsa-mir-849	CCAGUGUCUCCAGUAGUAGACA (SEQ. ID. NO: 680)
hsa-mir-850	GGAGAUGGAGCCAGGGCCCUAA (SEQ. ID. NO: 681)
hsa-mir-853	AACCAAGACCCCGGAGAUCCCA (SEQ. ID. NO: 682)
hsa-mir-857	CCGGGGAGCGGGGGCCCUGCCUU (SEQ. ID. NO: 683)
hsa-mir-864	CCUCUCAACUCAGCUUUU (SEQ. ID. NO: 684)
hsa-mir-151	CUAGACUGUGAGCUCCUCGA (SEQ. ID. NO: 685)

Table F4. Anti-microRNA sequences for microRNA in Table A8

MicroRNA	Anti-microRNA Sequence (5' → 3')
hsa-miR-544	AUUCUGCAUUUUUAGCAAGUUC (SEQ. ID. NO: 686)

The anti-microRNA molecule can be modified as described above for modified microRNA molecules. In one embodiment, the contiguous moieties in the anti-microRNA molecule are complementary to the corresponding microRNA molecule. The degree of complementarity of the anti-microRNA molecules are subject to the same restrictions described above for modified microRNA molecules, including the restriction relating to wobble base pairs, as well as those relating to additions, deletions and mismatches.

In a preferable embodiment, if the anti-microRNA molecule comprises only unmodified moieties, then the anti-microRNA molecule comprises at least one base, in the at least ten contiguous bases, which is non-complementary to the microRNA and/or comprises a chemical cap.

In another preferable embodiment, if the at least ten contiguous bases in an anti-microRNA molecule is perfectly (i.e., 100%) complementary to a microRNA molecule, then the anti-microRNA molecule contains at least one modified moiety in the at least ten contiguous bases and/or comprises a chemical cap.

In yet another embodiment, the moiety in the anti-microRNA molecule at the position corresponding to position 11 of a naturally occurring microRNA is non-complementary. The moiety in the anti-microRNA molecule corresponding to position 11 of a naturally occurring microRNA can be rendered non-complementary by the introduction of an addition, deletion or mismatch, as described above.

Utility

The microRNA molecules and anti-microRNA molecules of the present invention have numerous *in vitro, ex vivo,* and *in vivo* applications.

For example, the microRNA molecules and/or anti-microRNA molecules of the present invention can be introduced into a cell to study the function of the microRNA, and microRNA molecules in general.

In one embodiment, a microRNA in a cell is inhibited with a suitable anti-microRNA molecule. Alternatively, the activity of a microRNA molecule in a cell can be enhanced by

introducing into the cell one or more additional microRNA molecules. The function of the microRNA can be inferred by observing changes associated with inhibition and/or enhanced activity of the microRNA in the cell.

In one aspect of the invention, the invention relates to a method for inhibiting microRNP activity in a cell. The method for inhibiting microRNP activity in a cell comprises introducing into the cell a single-stranded anti-microRNA molecule of the invention. The microRNP comprises a microRNA molecule. Any anti-microRNA molecule can be used in the method for inhibiting microRNP activity in a cell, as long as the anti-microRNA molecule is complementary, subject to the restrictions described above, to the microRNA present in the microRNP.

The anti-microRNA molecules of the present invention are capable of inhibiting microRNP activity by binding to the microRNA in the microRNP in a host cell. MicroRNP activity refers to the cleavage or the repression of translation of a target sequence. The target sequence may be any sequence which is partially or perfectly complementary to the sequence of bases in a microRNA.

For example, the microRNA molecules and anti-microRNA molecules of the present invention may be used as a modulator of the expression of genes which are at least partially complementary to the anti-microRNA molecules or microRNA. For instance, if a particular microRNA is beneficial for the survival of a cell, an appropriate isolated microRNA of the present invention may be introduced into the cell to promote survival. Alternatively, if a particular microRNA is harmful (e.g., induces apoptosis, induces cancer, etc.), an appropriate anti-microRNA molecule can be introduced into the cell in order to inhibit the activity of the microRNA and reduce the harm.

The microRNA molecules and/or anti-microRNA molecules can be introduced into a cell by any method known to those skilled in the art. For example, the microRNA molecules and/or anti-microRNA molecules can be injected directly into a cell, such as by microinjection. Alternatively, the molecules can be contacted with a cell, preferably aided by a delivery system.

Useful delivery systems include, for example, liposomes and charged lipids. Liposomes typically encapsulate oligonucleotide molecules within their aqueous center. Charged lipids generally form lipid-oligonucleotide molecule complexes as a result of opposing charges.

These liposomes-oligonucleotide molecule complexes or lipid-oligonucleotide molecule complexes are usually internalized in cells by endocytosis. The liposomes or charged lipids generally comprise helper lipids which disrupt the endosomal membrane and release the oligonucleotide molecules.

Other methods for introducing a microRNA molecule or an anti-microRNA into a cell include use of delivery vehicles, such as dendrimers, biodegradable polymers, polymers of amino acids, polymers of sugars, and oligonucleotide-binding nanoparticles. In addition, pluoronic gel as a depot reservoir can be used to deliver the anti-microRNA oligonucleotide molecules over a prolonged period. The above methods are described in, for example, Hughes et al., Drug Discovery Today *6*, 303-315 (2001); Liang et al. Eur. J. Biochem. *269* 5753-5758 (2002); and Becker et al., In *Antisense Technology in the Central Nervous System* (Leslie, R.A., Hunter, A.J. & Robertson, H.A., eds), pp.147-157, Oxford University Press.

Targeting of a microRNA molecule or an anti-microRNA molecule to a particular cell can be performed by any method known to those skilled in the art. For example, the microRNA molecule or anti-microRNA molecule can be conjugated to an antibody or ligand specifically recognized by receptors on the cell.

The molecules can be administered to a mammal by any method known to those skilled in the art. Some examples of suitable modes of administration include oral and systemic administration. Systemic administration can be enteral or parenteral. Liquid or solid (e.g., tablets, gelatin capsules) formulations can be employed.

Parenteral administration of the molecules include, for example intravenous, intramuscular, and subcutaneous injections. For instance, a molecule may be administered to a mammal by sustained release, as is known in the art. Sustained release administration is a method of drug delivery to achieve a certain level of the drug over a particular period of time.

Other routes of administration include oral, topical, intrabronchial, or intranasal administration. For oral administration, liquid or solid formulations may be used. Some examples of formulations suitable for oral administration include tablets, gelatin capsules, pills, troches, elixirs, suspensions, syrups, and wafers. Intrabronchial administration can include an inhaler spray. For intranasal administration, administration of a molecule of the present invention can be accomplished by a nebulizer or liquid mist.

The molecules of the present invention can be in a suitable pharmaceutical carrier. In this specification, a pharmaceutical carrier is considered to be synonymous with a vehicle or an excipient as is understood by practitioners in the art. Examples of carriers include starch, milk, sugar, certain types of clay, gelatin, stearic acid or salts thereof, magnesium or calcium stearate, talc, vegetable fats or oils, gums and glycols.

The pharmaceutical carrier may also comprise one or more of the following: a stabilizer, a surfactant, preferably a nonionic surfactant, and optionally a salt and/or a buffering agent.

The stabilizer may, for example, be an amino acid, such as for instance, glycine; or an oligosaccharide, such as for example, sucrose, tetralose, lactose or a dextran. Alternatively, the stabilizer may be a sugar alcohol, such as for instance, mannitol; or a combination thereof. Preferably the stabilizer or combination of stabilizers constitutes from about 0.1% to about 10% weight for weight of the molecules.

The surfactant is preferably a nonionic surfactant, such as a polysorbate. Some examples of suitable surfactants include Tween 20, Tween 80; a polyethylene glycol or a polyoxyethylene polyoxypropylene glycol, such as Pluronic F-68 at from about 0.001% (w/v) to about 10% (w/v).

The salt or buffering agent may be any salt or buffering agent, such as for example sodium chloride, or sodium/potassium phosphate, respectively. Preferably, the buffering agent maintains the pH of the molecules of the present invention in the range of about 5.5 to about 7.5. The salt and/or buffering agent is also useful to maintain the osmolality at a level suitable for administration to a mammal. Preferably the salt or buffering agent is present at a roughly isotonic concentration of about 150 mM to about 300 mM.

The pharmaceutical carrier may additionally contain one or more conventional additives. Some examples of such additives include a solubilizer such as, for example, glycerol; an antioxidant such as for example, benzalkonium chloride (a mixture of quaternary ammonium compounds, known as "quart"), benzyl alcohol, chloretone or chlorobutanol; anaesthetic agent such as for example a morphine derivative; or an isotonic agent etc., such as described above. As a further precaution against oxidation or other spoilage, the molecules may be stored under nitrogen gas in vials sealed with impermeable stoppers.

Another in vitro application of the microRNA molecules and/or anti-microRNA molecules of the present invention is their use as diagnostic tools. For this purpose, the microRNA molecules and/or anti-microRNA molecules can be labeled.

The molecules of the present invention can be labeled in accordance with any method known in the art. For example, methods for labeling oligonucleotides have been described, for example, by Leary et al., 1983. *Proc. Natl. Acad. Sci. USA* 80:4045; Renz and Kurz 1984. *Nucl. Acids Res.* 12:3435; Richardson and Gumport 1983. *Nucl. Acids Res.* 11:6167; Smith et al. 1985. *Nucl. Acids Res.* 13:2399; Meinkoth and Wahl, Anal. 1984. *Biochem.* 138:267; and Ausubel, F.M. et al. (Eds.) Current Protocols in Molecular Biology, John Wiley & Sons, Inc., New York, 1999, each of which is incorporated herein by reference.

The label may be radioactive. Some examples of useful radioactive labels include ^{32}P, ^{125}I, ^{131}I, ^{35}S, ^{14}C, and ^{3}H. Use of radioactive labels have been described in U.K. 2,034,323, U.S. 4,358,535, and U.S. 4,302,204.

Some examples of non-radioactive labels include enzymes and chromophores. Useful enzymatic labels include enzymes that cause a detectable change in a substrate. Some useful enzymes and their substrates include, for example, horseradish peroxidase (pyrogallol and o-phenylenediamine), beta-galactosidase (fluorescein beta-D-galactopyranoside), and alkaline phosphatase (5-bromo-4-chloro-3-indolyl phosphate/nitro blue tetrazolium). The use of enzymatic labels have been described in U.K. 2,019,404, EP 63,879, in Ausubel, F.M. et al. (Eds.), Rotman 1961. *Proc. Natl. Acad. Sci. USA* 47:1981-1991, and by Current Protocols in Molecular Biology, John Wiley & Sons, Inc., New York (1999).

Useful chromophores include, for example, fluorescent, chemiluminescent, and bioluminescent molecules, as well as dyes. Some specific chromophores useful in the present invention include, for example, fluorescein, rhodamine, Cy3, Cy5, Texas red, phycoerythrin, umbelliferone, luminol.

The labels may be conjugated to the molecules of the present invention by methods that are well known in the art. The labels may be directly attached through a functional group on the molecule. The probe either contains or can be caused to contain such a functional group. Some examples of suitable functional groups include, for example, amino, carboxyl, sulfhydryl, maleimide, isocyanate, isothiocyanate.

Alternatively, labels such as enzymes and chromophoric molecules may be conjugated to the molecules by means of coupling agents, such as dialdehydes, carbodiimides, dimaleimides, and the like. The label may also be conjugated to the molecule by means of a ligand attached to the molecule by a method described above and a receptor for that ligand attached to the label. Any of the known ligand-receptor combinations is suitable. Some suitable ligand-receptor pairs include, for example, biotin-avidin or -streptavidin, and antibody-antigen. The biotin-avidin combination is preferred.

Some microRNAs are expressed in specific tissues or cells. The expression of the microRNAs of the present invention in various tissues is shown below in Table G and Table G1. Table G and Table G1 show the relative cloning frequency in percent relative to total number of identified microRNAs for each given library. In Table G and Table G1, the expression of a given microRNA continues across several pages.

The expression of a microRNA is considered to be specifically enriched in a tissue- or cell type if its expression is more than about three-fold, preferably more than about four-fold, and more preferably more than about five-fold more than its expression in other tissue- or cell -types. For example, microRNA hsa-mir-20b is expressed in the B-cell derived lymphoma BL41 (0.05% expression); in the embryonal derived cell line/tumor NT2/D1 (0.37% expression) NCCIT (0.72% expression), and Hek (0.13% expression); small cell adreno-carcinoma cell line SW13 (without and with yellow fever virus infection; 2.01% and 2.93% expression, respectively); and ductile breast carcinoma HCC38 (0.09% expression). The expression of

microRNA hsa-mir-20b is considered to be enriched in small cell adreno-carcinoma cell line SW13 since its expression is about three-fold more than that of its expression in other tissue- and cell-types.

Thus, for instance, anti-microRNA molecules of the present invention can be used as a probe to identify a particular tissue- or cell type.

In addition, the microRNA molecules and/or anti-microRNA molecules of the present invention can be used in microarrays for microRNA expression analysis. For example, the anti-microRNA molecules of the present invention can be labeled in a microarray. Samples containing microRNAs can be added and the hybridization detected. Such microarrays may be used in, for example, diagnostic assays to survey microRNA expression in clinical samples of cancer patients and contribute to the diagnosis and staging for risk evaluation for certain cancer types.

Table G: Relative Cloning Frequency in % Relative to Total Number of Identified MicroRNA for Each Given Library.

	Adult brain		
miRNA	cerebellum	frontalcortex	midbrain
hsa-mir-20b	-	-	-
hsa-mir-301b	-	-	-
hsa-mir-302b	-	-	-
hsa-mir-302c	-	-	-
hsa-mir-302d	-	-	-
hsa-mir-329	-	-	0.07
hsa-mir-367	-	-	-
hsa-mir-368	0.13	0.26	-
hsa-mir-369	-	-	-
hsa-mir-374a	-	0.07	0.07
hsa-mir-374b	-	-	0.07
hsa-mir-410	-	-	0.07
hsa-mir-421	-	-	-
hsa-mir-423	-	-	0.07
hsa-mir-425	-	0.20	0.40
hsa-mir-500	0.13	-	0.07
hsa-mir-502	-	-	-
hsa-mir-504	-	-	-
hsa-mir-519	-	-	-
hsa-mir-604	0.13	0.26	0.61
hsa-mir-610	-	-	-
hsa-mir-615	-	-	-
hsa-mir-618	-	-	-
hsa-mir-619	-	-	-
hsa-mir-620	-	-	-
hsa-mir-631	-	-	-
hsa-mir-720a	-	-	-
hsa-mir-720b	-	-	-
hsa-mir-800a	-	0.07	0.07
hsa-mir-800b	-	-	0.07
hsa-mir-803	-	-	-
hsa-mir-805	-	-	-
hsa-mir-451	0.13	0.53	0.88
hsa-mir-433	-	-	0.07
hsa-mir-431	-	0.13	-
hsa-mir-452	-	-	-
hsa-mir-453	-	-	-
hsa-mir-813	-	-	0.07
hsa-mir-814	-	-	-
hsa-mir-815	-	0.07	0.13
hsa-mir-816	-	-	-
hsa-mir-817	-	-	-
hsa-mir-818	-	-	-
hsa-mir-819	0.13	0.20	-
hsa-mir-821	-	-	-
hsa-mir-822	-	-	-
hsa-mir-823	0.13	-	-
hsa-mir-824	-	0.07	0.07
hsa-mir-825	-	-	-
hsa-mir-826	-	-	-
hsa-mir-827	-	-	-
hsa-mir-828	-	0.13	0.07
hsa-mir-829	-	-	-
hsa-mir-831	-	-	-
hsa-mir-832	-	-	-
hsa-mir-834	-	-	-
hsa-mir-835	-	-	-
hsa-mir-837	-	-	-
hsa-mir-838	-	-	-

	Medulloblastoma	Neuroblastoma		
mIRNA	DAOY	BE(2)-M17	SH-SY5Y	SH-SY5Y_retinoic acid
hsa-mir-20b	-	-	-	-
hsa-mir-301b	-	0.62	0.32	0.74
hsa-mir-302b	-	-	-	-
hsa-mir-302c	-	-	-	-
hsa-mir-302d	-	-	-	-
hsa-mir-329	-	-	-	-
hsa-mir-367	-	-	-	-
hsa-mir-368	0.90	0.31	0.16	-
hsa-mir-369	-	-	-	-
hsa-mir-374a	-	-	0.08	0.54
hsa-mir-374b	-	-	0.89	-
hsa-mir-410	-	0.31	-	-
hsa-mir-421	-	-	-	-
hsa-mir-423	0.90	-	1.13	0.40
hsa-mir-425	0.23	0.16	0.81	2.02
hsa-mir-500	-	0.16	-	-
hsa-mir-502	0.23	0.93	-	-
hsa-mir-504	-	-	-	-
hsa-mir-519	-	-	-	-
hsa-mir-604	-	-	1.62	0.94
hsa-mir-610	-	-	-	-
hsa-mir-615	0.11	-	-	-
hsa-mir-618	-	-	-	-
hsa-mir-619	-	-	-	-
hsa-mir-620	-	-	-	-
hsa-mir-631	-	-	-	-
hsa-mir-720a	-	-	-	-
hsa-mir-720b	-	-	-	-
hsa-mir-800a	-	-	-	-
hsa-mir-800b	-	0.31	-	-
hsa-mir-803	-	-	-	-
hsa-mir-805	-	0.16	-	-
hsa-mir-451	-	-	-	-
hsa-mir-433	-	-	-	-
hsa-mir-431	-	0.47	-	-
hsa-mir-452	-	-	-	-
hsa-mir-453	-	0.16	-	-
hsa-mir-813	0.23	0.16	-	-
hsa-mir-814	-	0.31	0.32	0.67
hsa-mir-815	-	-	0.48	0.40
hsa-mir-816	-	-	-	-
hsa-mir-817	-	-	-	0.13
hsa-mir-818	-	-	-	-
hsa-mir-819	-	-	-	-
hsa-mir-821	-	-	-	-
hsa-mir-822	0.23	-	-	-
hsa-mir-823	-	-	-	-
hsa-mir-824	-	-	-	-
hsa-mir-825	-	-	-	-
hsa-mir-826	-	-	-	-
hsa-mir-827	-	-	-	-
hsa-mir-828	-	-	-	-
hsa-mir-829	-	-	-	-
hsa-mir-831	-	-	-	-
hsa-mir-832	-	0.62	0.32	0.40
hsa-mir-834	-	0.93	-	-
hsa-mir-835	-	-	0.32	-
hsa-mir-837	-	0.16	-	-
hsa-mir-838	-	-	-	-

	Skin	Liver	Hepatocellular carcinoma		Hepatoblastoma
miRNA	fibroblasts_CMV	liver	Huh7.5	Huh7.5_HCV	PLC
hsa-mir-20b	-	-	-	-	-
hsa-mir-301b	-	-	-	-	-
hsa-mir-302b	-	-	-	-	-
hsa-mir-302c	-	-	-	-	-
hsa-mir-302d	-	-	-	-	-
hsa-mir-329	-	-	-	-	-
hsa-mir-367	-	-	-	-	-
hsa-mir-368	0.60	-	-	-	-
hsa-mir-369	0.40	-	-	-	-
hsa-mir-374a	0.40	-	0.52	3.33	0.94
hsa-mir-374b	-	-	-	-	1.96
hsa-mir-410	-	-	-	-	-
hsa-mir-421	-	-	0.26	-	0.29
hsa-mir-423	-	-	0.26	-	0.22
hsa-mir-425	-	0.07	-	-	1.81
hsa-mir-500	0.20	-	-	-	0.07
hsa-mir-502	0.20	0.07	-	-	-
hsa-mir-504	-	-	-	-	0.44
hsa-mir-519	0.20	0.07	-	-	-
hsa-mir-604	0.60	-	0.52	-	0.22
hsa-mir-610	0.20	-	-	1.67	-
hsa-mir-615	-	-	-	-	-
hsa-mir-618	-	-	-	-	-
hsa-mir-619	-	-	-	-	-
hsa-mir-620	-	-	-	-	-
hsa-mir-631	-	-	-	-	-
hsa-mir-720a	-	-	-	-	-
hsa-mir-720b	-	-	-	-	-
hsa-mir-800a	-	-	-	-	-
hsa-mir-800b	-	-	-	-	-
hsa-mir-803	-	-	-	-	-
hsa-mir-805	-	-	-	-	0.07
hsa-mir-451	-	0.50	-	-	-
hsa-mir-433	-	-	-	-	-
hsa-mir-431	-	-	-	-	-
hsa-mir-452	-	-	-	-	-
hsa-mir-453	-	-	-	-	-
hsa-mir-813	0.20	-	-	-	-
hsa-mir-814	-	-	-	-	-
hsa-mir-815	-	-	-	-	-
hsa-mir-816	-	-	-	-	0.07
hsa-mir-817	-	0.07	-	-	-
hsa-mir-818	-	-	-	-	-
hsa-mir-819	-	0.07	-	-	-
hsa-mir-821	-	-	-	-	-
hsa-mir-822	0.40	-	-	-	-
hsa-mir-823	-	0.07	-	-	0.07
hsa-mir-824	-	-	-	-	-
hsa-mir-825	-	-	-	-	0.07
hsa-mir-826	-	-	-	-	-
hsa-mir-827	-	-	-	-	-
hsa-mir-828	-	-	-	-	-
hsa-mir-829	-	-	-	-	-
hsa-mir-831	-	-	-	-	-
hsa-mir-832	-	-	-	-	-
hsa-mir-834	0.20	-	-	-	-
hsa-mir-835	-	-	-	-	-
hsa-mir-837	-	-	-	-	-
hsa-mir-838	-	-	-	-	-

	Activated B-cells	B-cell derived lymphomas				
miRNA	primary B cells	BL41	BL41/95	LY3	U266	BCBL1
hsa-mir-20b	-	0.05	-	-	-	-
hsa-mir-301b	-	0.20	-	-	-	0.73
hsa-mir-302b	-	-	-	-	-	-
hsa-mir-302c	-	-	-	-	-	-
hsa-mir-302d	-	-	-	-	-	-
hsa-mir-329	-	-	-	-	-	-
hsa-mir-367	-	-	-	-	-	-
hsa-mir-368	-	-	-	-	-	-
hsa-mir-369	-	-	-	-	-	-
hsa-mir-374a	-	0.10	-	-	-	0.25
hsa-mir-374b	-	0.10	-	-	0.41	0.25
hsa-mir-410	-	-	-	-	-	-
hsa-mir-421	-	-	-	-	-	0.25
hsa-mir-423	-	0.29	-	-	-	-
hsa-mir-425	2.50	0.10	0.29	0.99	0.82	0.48
hsa-mir-500	-	0.49	0.15	-	0.41	-
hsa-mir-502	-	-	-	-	-	-
hsa-mir-504	-	-	-	-	-	0.49
hsa-mir-519	-	-	0.15	-	-	-
hsa-mir-604	-	-	-	-	-	-
hsa-mir-610	-	0.10	-	-	-	-
hsa-mir-615	-	-	-	-	-	-
hsa-mir-618	-	-	-	-	-	-
hsa-mir-619	-	-	-	-	-	-
hsa-mir-620	-	-	-	-	-	-
hsa-mir-631	-	-	-	-	-	-
hsa-mir-720a	-	-	-	-	-	0.25
hsa-mir-720b	-	-	-	-	-	-
hsa-mir-800a	-	-	-	-	-	-
hsa-mir-800b	-	-	-	-	-	-
hsa-mir-803	-	-	-	-	-	-
hsa-mir-805	-	-	-	-	-	-
hsa-mir-451	-	-	-	-	-	-
hsa-mir-433	-	-	-	-	-	-
hsa-mir-431	-	-	-	-	-	-
hsa-mir-452	-	-	-	-	-	-
hsa-mir-453	-	-	-	-	-	-
hsa-mir-813	-	-	-	-	-	-
hsa-mir-814	-	-	-	-	-	-
hsa-mir-815	-	0.10	-	-	-	-
hsa-mir-816	-	-	-	-	-	-
hsa-mir-817	-	-	-	-	-	-
hsa-mir-818	-	0.20	-	-	-	-
hsa-mir-819	-	-	-	-	-	-
hsa-mir-821	-	-	0.29	-	-	-
hsa-mir-822	-	-	-	-	-	-
hsa-mir-823	-	-	-	-	-	0.25
hsa-mir-824	-	-	-	-	-	-
hsa-mir-825	-	-	-	-	-	-
hsa-mir-826	-	-	-	-	-	-
hsa-mir-827	-	-	-	-	-	-
hsa-mir-828	-	-	-	-	-	-
hsa-mir-829	-	-	-	0.50	-	-
hsa-mir-831	-	-	-	-	-	-
hsa-mir-832	-	-	-	-	-	-
hsa-mir-834	-	-	-	-	-	-
hsa-mir-835	-	-	-	-	-	-
hsa-mir-837	-	-	-	-	-	-
hsa-mir-838	-	-	0.15	-	-	-

	Spleen	Endocrine organs				
mIRNA	spleen	pituitary	SW13	SW13-YFV	ovary	testis
hsa-mir-20b	-	-	2.01	2.93	-	-
hsa-mir-301b	-	-	0.13	0.61	-	-
hsa-mir-302b	-	-	-	-	-	-
hsa-mir-302c	-	-	-	-	-	-
hsa-mir-302d	-	-	-	-	-	-
hsa-mir-329	-	0.06	-	-	-	-
hsa-mir-367	-	-	-	-	-	-
hsa-mir-368	0.18	0.62	-	-	0.30	0.30
hsa-mir-369	-	0.12	-	-	-	-
hsa-mir-374a	-	0.12	0.07	-	0.08	-
hsa-mir-374b	-	0.06	0.20	-	0.08	-
hsa-mir-410	-	0.43	-	-	-	-
hsa-mir-421	-	-	-	-	-	-
hsa-mir-423	0.92	-	-	0.24	0.38	0.07
hsa-mir-425	0.18	0.06	0.40	0.61	0.08	0.15
hsa-mir-500	-	0.06	-	0.24	-	-
hsa-mir-502	-	0.06	-	0.12	-	0.74
hsa-mir-504	-	-	0.13	0.12	-	-
hsa-mir-519	0.18	-	-	-	0.15	-
hsa-mir-604	0.18	0.06	-	-	0.23	0.15
hsa-mir-610	-	-	0.13	0.12	0.15	0.07
hsa-mir-615	-	-	-	0.24	-	-
hsa-mir-618	-	-	-	0.24	-	-
hsa-mir-619	-	0.06	-	0.24	-	-
hsa-mir-620	-	-	-	-	-	-
hsa-mir-631	-	-	-	-	-	-
hsa-mir-720a	-	-	-	-	-	0.30
hsa-mir-720b	-	-	0.13	-	-	-
hsa-mir-800a	-	0.18	-	-	-	-
hsa-mir-800b	-	-	-	-	-	-
hsa-mir-803	-	-	-	-	-	-
hsa-mir-805	-	-	-	-	-	-
hsa-mir-451	0.18	1.29	-	-	0.75	0.07
hsa-mir-433	-	0.06	-	-	-	-
hsa-mir-431	-	-	-	-	-	-
hsa-mir-452	-	-	-	-	-	-
hsa-mir-453	-	-	-	-	-	-
hsa-mir-813	-	0.06	-	-	-	-
hsa-mir-814	-	-	-	-	-	-
hsa-mir-815	-	0.06	-	-	-	-
hsa-mir-816	-	0.06	0.13	0.12	-	-
hsa-mir-817	-	-	-	-	-	-
hsa-mir-818	-	-	-	-	-	-
hsa-mir-819	-	-	-	-	-	-
hsa-mir-821	-	-	-	-	-	-
hsa-mir-822	-	-	-	-	-	-
hsa-mir-823	0.18	-	-	-	-	-
hsa-mir-824	-	-	-	-	-	-
hsa-mir-825	-	0.31	-	-	-	-
hsa-mir-826	-	0.12	-	-	0.15	0.59
hsa-mir-827	-	0.08	-	-	-	0.44
hsa-mir-828	-	-	-	0.12	-	-
hsa-mir-829	-	-	-	0.24	-	-
hsa-mir-831	-	-	0.13	0.12	-	-
hsa-mir-832	-	-	-	-	-	-
hsa-mir-834	-	-	-	-	-	-
hsa-mir-835	-	-	0.27	-	-	-
hsa-mir-837	-	0.06	-	-	-	0.07
hsa-mir-838	-	-	-	-	-	-

	Embryonal derived cell lines/tumors				Cervic carcinoma	Epididymis
miRNA	N12/D1	Saos-2	NCCIT	Hek	HeLa S3	epididymis
hsa-mir-20b	0.37	-	0.72	0.13	-	-
hsa-mir-301b	-	-	-	-	-	-
hsa-mir-302b	3.90	-	15.22	-	-	-
hsa-mir-302c	9.06	-	5.07	-	-	-
hsa-mir-302d	1.50	-	4.35	-	-	-
hsa-mir-329	-	-	-	-	-	-
hsa-mir-367	9.71	-	10.14	-	-	-
hsa-mir-368	-	-	-	-	-	-
hsa-mir-369	-	-	-	-	-	-
hsa-mir-374a	1.35	-	-	0.25	0.32	0.16
hsa-mir-374b	0.49	-	1.45	0.25	0.16	-
hsa-mir-410	-	-	-	-	-	-
hsa-mir-421	-	-	-	-	0.16	0.08
hsa-mir-423	-	1.69	0.72	-	0.32	-
hsa-mir-425	0.12	-	-	0.76	0.16	-
hsa-mir-500	0.12	-	-	0.25	-	-
hsa-mir-502	-	-	-	0.25	0.48	-
hsa-mir-504	-	-	-	0.51	0.16	-
hsa-mir-519	-	-	-	0.25	0.16	-
hsa-mir-604	0.12	-	-	0.25	-	-
hsa-mir-610	0.12	-	-	0.25	-	0.24
hsa-mir-615	-	-	-	-	-	-
hsa-mir-618	-	-	-	-	-	-
hsa-mir-619	-	-	-	-	-	-
hsa-mir-620	-	-	-	-	-	-
hsa-mir-631	-	-	-	-	-	-
hsa-mir-720a	-	-	-	-	-	0.08
hsa-mir-720b	-	-	-	-	-	-
hsa-mir-800a	-	-	-	-	-	-
hsa-mir-800b	-	-	-	-	-	-
hsa-mir-803	0.25	-	-	0.25	-	-
hsa-mir-805	-	-	-	-	-	-
hsa-mir-451	-	-	-	-	-	0.40
hsa-mir-433	-	-	-	-	-	-
hsa-mir-431	-	-	-	-	-	-
hsa-mir-452	-	-	-	-	-	-
hsa-mir-453	-	-	-	-	-	-
hsa-mir-813	-	-	-	-	-	-
hsa-mir-814	0.12	-	-	-	-	-
hsa-mir-815	0.12	-	-	0.51	-	-
hsa-mir-816	-	-	-	0.25	-	-
hsa-mir-817	-	-	-	-	-	-
hsa-mir-818	-	-	0.72	-	0.16	-
hsa-mir-819	-	-	-	-	-	-
hsa-mir-821	-	-	-	-	-	-
hsa-mir-822	-	-	-	-	-	-
hsa-mir-823	-	-	-	-	-	-
hsa-mir-824	-	-	-	-	-	-
hsa-mir-825	-	-	-	0.25	-	-
hsa-mir-826	-	-	-	-	-	-
hsa-mir-827	-	-	-	-	-	-
hsa-mir-828	-	-	-	-	-	-
hsa-mir-829	-	-	-	-	0.16	-
hsa-mir-831	-	-	-	-	-	-
hsa-mir-832	-	-	-	-	-	-
hsa-mir-834	-	-	-	-	-	0.08
hsa-mir-835	-	-	-	-	-	-
hsa-mir-837	0.12	-	-	-	-	-
hsa-mir-838	-	-	-	-	0.16	-

	Breast carcinoma					
miRNA	MCF10A	MCF7	HCC38	SkBr3	BT474	T47
hsa-mir-20b	-	-	0.09	-	-	-
hsa-mir-301b	-	-	-	-	-	0.60
hsa-mir-302b	-	-	-	-	-	-
hsa-mir-302c	-	-	-	-	-	-
hsa-mir-302d	-	-	-	-	-	-
hsa-mir-329	-	-	-	-	-	-
hsa-mir-367	-	-	-	-	-	-
hsa-mir-368	-	0.25	-	-	-	-
hsa-mir-369	-	-	-	-	-	-
hsa-mir-374a	-	-	0.09	0.47	-	0.09
hsa-mir-374b	-	-	0.19	-	0.05	0.43
hsa-mir-410	-	-	-	-	-	-
hsa-mir-421	-	0.13	-	-	-	0.09
hsa-mir-423	0.19	0.25	0.47	0.12	0.42	0.51
hsa-mir-425	-	0.38	0.75	0.93	1.50	2.22
hsa-mir-500	-	-	0.19	-	0.98	0.34
hsa-mir-502	-	0.50	-	-	-	-
hsa-mir-504	0.09	0.13	0.09	0.23	0.61	0.09
hsa-mir-519	0.09	0.13	-	0.23	0.05	0.17
hsa-mir-604	0.19	-	0.19	-	0.19	0.17
hsa-mir-610	-	-	-	-	-	-
hsa-mir-615	-	-	-	-	-	-
hsa-mir-618	-	-	-	-	-	-
hsa-mir-619	-	-	-	-	-	-
hsa-mir-620	-	0.25	-	-	-	-
hsa-mir-631	-	0.25	-	-	-	-
hsa-mir-720a	-	-	-	-	-	-
hsa-mir-720b	-	-	-	-	-	-
hsa-mir-800a	-	-	-	-	-	-
hsa-mir-800b	-	-	-	-	-	-
hsa-mir-803	-	-	-	-	-	-
hsa-mir-805	-	-	-	-	-	-
hsa-mir-451	-	-	-	-	-	-
hsa-mir-433	-	-	-	-	-	-
hsa-mir-431	-	-	-	-	-	-
hsa-mir-452	-	-	-	0.12	0.05	-
hsa-mir-453	-	-	-	-	-	-
hsa-mir-813	-	-	-	-	-	-
hsa-mir-814	-	-	-	-	-	-
hsa-mir-815	-	0.13	0.09	-	0.05	-
hsa-mir-816	0.09	0.13	-	-	-	-
hsa-mir-817	-	-	-	-	-	-
hsa-mir-818	-	-	-	-	0.05	-
hsa-mir-819	-	-	-	-	-	-
hsa-mir-821	-	-	-	-	-	-
hsa-mir-822	-	-	-	-	-	-
hsa-mir-823	-	-	-	-	-	-
hsa-mir-824	-	-	-	-	-	-
hsa-mir-825	-	-	-	-	-	-
hsa-mir-826	-	-	-	-	-	-
hsa-mir-827	-	-	-	-	-	-
hsa-mir-828	-	-	-	-	-	-
hsa-mir-829	-	-	0.09	-	0.05	0.09
hsa-mir-831	-	-	-	-	-	-
hsa-mir-832	-	-	-	-	-	-
hsa-mir-834	-	0.13	-	-	-	-
hsa-mir-835	-	-	-	-	0.05	-
hsa-mir-837	-	-	-	-	-	-
hsa-mir-838	-	-	-	-	-	0.09

	Adult brain		
miRNA	cerebellum	frontalcortex	midbrain
hsa-mir-839	-	-	0.07
hsa-mir-841	0.51	-	-
hsa-mir-842	-	-	-
hsa-mir-843	-	0.07	-
hsa-mir-845	-	-	-
hsa-mir-846	-	-	0.07
hsa-mir-847	-	-	-
hsa-mir-848	-	-	-
hsa-mir-849	-	-	-
hsa-mir-850	0.13	-	-
hsa-mir-851	-	-	-
hsa-mir-852	-	-	-
hsa-mir-853	-	-	-
hsa-mir-854	0.26	-	-
hsa-mir-855	-	0.13	-
hsa-mir-857	-	-	-
hsa-mir-864	-	-	-
hsa-mir-867	-	-	0.07
hsa-mir-869	-	-	0.07
hsa-mir-871	-	-	-
hsa-mir-883	-	-	-
hsa-mir-884	-	-	-
hsa-mir-885	-	-	-
hsa-mir-886	-	-	-
hsa-mir-887	-	-	-
hsa-mir-888	-	-	-
hsa-mir-889	-	-	-
hsa-mir-890	-	-	-
hsa-mir-891	-	-	-
hsa-mir-892	-	-	-
hsa-mir-893	-	-	-
hsa-mir-894	-	-	-
hsa-mir-92b	-	0.07	0.07

	Medulloblastoma	Neuroblastoma		
miRNA	DAOY	BE(2)-M17	SH-SY5Y	SH-SY5Y_retinoic acid
hsa-mir-839	-	-	-	-
hsa-mir-841	-	-	0.65	0.40
hsa-mir-842	-	0.16	0.16	-
hsa-mir-843	0.45	0.93	2.10	2.02
hsa-mir-845	0.23	-	0.32	-
hsa-mir-846	-	-	-	0.13
hsa-mir-847	-	-	-	-
hsa-mir-848	-	-	-	-
hsa-mir-849	-	-	-	-
hsa-mir-850	-	-	-	-
hsa-mir-851	-	-	-	0.13
hsa-mir-852	-	-	-	-
hsa-mir-853	-	-	0.32	0.13
hsa-mir-854	-	0.16	-	-
hsa-mir-855	-	-	-	-
hsa-mir-857	-	-	0.32	0.27
hsa-mir-864	-	-	-	-
hsa-mir-867	-	-	-	-
hsa-mir-869	-	0.16	-	-
hsa-mir-871	0.23	-	-	-
hsa-mir-883	-	-	-	-
hsa-mir-884	-	0.16	-	-
hsa-mir-885	-	-	-	-
hsa-mir-886	-	-	-	-
hsa-mir-887	-	-	-	-
hsa-mir-888	-	-	-	-
hsa-mir-889	-	-	-	-
hsa-mir-890	-	-	-	-
hsa-mir-891	-	-	-	0.13
hsa-mir-892	-	-	-	-
hsa-mir-893	-	-	-	-
hsa-mir-894	-	-	-	-
hsa-mir-92b	-	-	-	-

	Skin	Liver	Hepatocellular carcinoma		Hepatoblastoma
miRNA	fibroblasts_CMV	liver	Huh7.5	Huh7.5_HCV	PLC
hsa-mir-839	-	0.07	-	-	-
hsa-mir-841	-	-	-	-	-
hsa-mir-842	-	-	-	-	-
hsa-mir-843	0.20	-	-	-	-
hsa-mir-845	-	-	-	-	-
hsa-mir-846	-	-	-	-	-
hsa-mir-847	-	-	-	-	-
hsa-mir-848	0.40	-	-	-	-
hsa-mir-849	-	-	-	-	-
hsa-mir-850	0.20	-	-	-	-
hsa-mir-851	-	-	-	-	-
hsa-mir-852	-	-	-	-	0.29
hsa-mir-853	-	-	-	-	0.07
hsa-mir-854	-	0.07	-	-	-
hsa-mir-855	-	-	0.26	-	-
hsa-mir-857	-	-	-	-	-
hsa-mir-864	-	-	-	-	-
hsa-mir-867	-	-	0.13	-	-
hsa-mir-869	-	-	-	-	-
hsa-mir-871	0.40	-	0.26	-	-
hsa-mir-883	-	-	-	-	-
hsa-mir-884	-	-	-	-	-
hsa-mir-885	-	-	-	-	-
hsa-mir-886	-	-	-	-	-
hsa-mir-887	-	-	-	-	-
hsa-mir-888	-	-	-	-	-
hsa-mir-889	-	-	-	-	-
hsa-mir-890	-	-	-	-	-
hsa-mir-891	-	-	-	-	-
hsa-mir-892	0.20	-	-	-	-
hsa-mir-893	-	-	-	-	-
hsa-mir-894	-	-	-	-	-
hsa-mir-92b	-	-	-	-	0.04

	Activated B-cells	B-cell derived lymphomas				
mIRNA	primary B cells	BL41	BL41/95	LY3	U266	BCBL1
hsa-mir-839	-	-	-	-	-	-
hsa-mir-841	-	-	-	-	-	-
hsa-mir-842	-	-	-	-	-	-
hsa-mir-843	-	-	-	-	-	-
hsa-mir-845	-	-	-	-	-	-
hsa-mir-846	-	-	-	-	-	-
hsa-mir-847	-	-	-	-	-	-
hsa-mir-848	-	-	-	-	-	-
hsa-mir-849	-	-	-	-	-	-
hsa-mir-850	-	-	-	-	-	-
hsa-mir-851	-	-	-	-	-	-
hsa-mir-852	-	-	-	-	-	-
hsa-mir-853	-	-	-	-	-	-
hsa-mir-854	-	-	-	-	-	-
hsa-mir-855	-	-	-	-	-	-
hsa-mir-857	-	-	-	-	-	-
hsa-mir-864	-	-	-	-	-	-
hsa-mir-867	-	-	-	-	-	-
hsa-mir-869	-	-	-	-	-	-
hsa-mir-871	-	-	-	-	-	1.45
hsa-mir-883	-	-	-	-	-	-
hsa-mir-884	-	-	-	-	-	-
hsa-mir-885	-	-	-	-	-	-
hsa-mir-886	-	-	-	-	-	-
hsa-mir-887	-	-	-	-	-	-
hsa-mir-888	-	-	-	-	-	-
hsa-mir-889	-	-	-	-	0.41	-
hsa-mir-890	-	-	-	-	-	-
hsa-mir-891	-	-	-	-	-	-
hsa-mir-892	-	-	-	-	-	-
hsa-mir-893	-	-	-	-	-	-
hsa-mir-894	-	-	-	-	-	-
hsa-mir-92b	-	-	-	0.50	-	0.49

	Spleen	Endocrine organs				
miRNA	spleen	pituitary	SW13	SW13-YFV	ovary	testis
hsa-mir-839	0.18	-	-	-	-	-
hsa-mir-841	-	-	-	-	-	-
hsa-mir-842	-	-	-	-	-	-
hsa-mir-843	-	0.06	-	-	0.45	-
hsa-mir-845	-	-	-	0.12	-	-
hsa-mir-846	-	-	-	-	-	-
hsa-mir-847	-	-	-	-	-	-
hsa-mir-848	-	-	-	-	-	-
hsa-mir-849	-	-	-	-	-	-
hsa-mir-850	-	-	-	-	-	-
hsa-mir-851	-	-	-	-	-	-
hsa-mir-852	-	-	-	-	-	-
hsa-mir-853	0.18	-	-	-	-	-
hsa-mir-854	-	-	-	-	0.08	-
hsa-mir-855	0.18	0.12	-	-	0.53	0.52
hsa-mir-857	-	-	0.13	-	-	-
hsa-mir-864	-	-	-	-	-	-
hsa-mir-867	0.09	-	0.13	0.18	-	0.07
hsa-mir-869	-	-	-	-	-	-
hsa-mir-871	-	-	0.13	-	-	-
hsa-mir-883	-	0.06	-	-	-	-
hsa-mir-884	-	-	-	-	-	-
hsa-mir-885	-	-	0.13	0.24	-	-
hsa-mir-886	-	-	-	-	-	-
hsa-mir-887	-	-	-	0.24	-	-
hsa-mir-888	-	-	-	-	-	0.07
hsa-mir-889	-	-	-	-	-	-
hsa-mir-890	-	-	-	-	-	-
hsa-mir-891	-	-	-	-	-	-
hsa-mir-892	-	-	-	-	-	-
hsa-mir-893	0.18	-	-	-	-	-
hsa-mir-894	-	-	-	-	-	-
hsa-mir-92b	0.55	0.06	0.13	0.12	-	-

	Embryonal derived cell lines/tumors				Cervic carcinoma	Epididymis
miRNA	NT2/D1	Saos-2	NCCIT	Hek	HeLa S3	epididymis
hsa-mir-839	-	1.69	-	-	-	-
hsa-mir-841	0.12	-	-	-	-	-
hsa-mir-842	0.12	-	-	-	-	-
hsa-mir-843	1.97	-	-	0.25	-	-
hsa-mir-845	0.12	-	-	-	-	-
hsa-mir-846	-	-	-	-	-	-
hsa-mir-847	-	-	-	-	-	-
hsa-mir-848	-	-	-	-	-	-
hsa-mir-849	-	-	-	-	-	-
hsa-mir-850	-	-	-	-	-	-
hsa-mir-851	0.12	-	-	-	-	-
hsa-mir-852	0.37	-	-	-	-	-
hsa-mir-853	-	-	-	-	-	-
hsa-mir-854	-	-	-	-	-	-
hsa-mir-855	-	-	-	-	0.32	0.16
hsa-mir-857	0.12	-	-	-	-	-
hsa-mir-864	0.25	-	-	-	-	-
hsa-mir-867	-	-	-	-	-	-
hsa-mir-869	-	-	-	-	-	-
hsa-mir-871	-	-	0.72	-	0.32	-
hsa-mir-883	-	-	-	-	-	-
hsa-mir-884	-	-	-	-	-	-
hsa-mir-885	-	-	-	-	-	-
hsa-mir-886	-	-	-	-	-	-
hsa-mir-887	-	-	-	-	-	-
hsa-mir-888	-	-	-	-	-	-
hsa-mir-889	-	-	-	-	-	-
hsa-mir-890	-	-	-	-	-	-
hsa-mir-891	-	-	-	-	-	-
hsa-mir-892	-	-	-	-	-	-
hsa-mir-893	-	-	-	-	-	-
hsa-mir-894	-	-	-	-	-	-
hsa-mir-92b	0.37	-	-	-	0.16	-

	Breast carcinoma					
miRNA	MCF10A	MCF7	HCC38	SkBr3	BT474	T47
hsa-mir-839	-	-	-	-	-	-
hsa-mir-841	-	-	-	-	-	-
hsa-mir-842	-	-	-	-	-	-
hsa-mir-843	-	0.13	-	-	0.23	-
hsa-mir-845	-	-	-	-	-	-
hsa-mir-846	-	-	-	-	-	-
hsa-mir-847	-	-	-	0.23	-	-
hsa-mir-848	-	-	-	-	-	-
hsa-mir-849	-	-	-	0.23	-	-
hsa-mir-850	-	-	-	-	-	-
hsa-mir-851	-	-	-	-	-	-
hsa-mir-852	-	-	-	0.12	-	-
hsa-mir-853	-	0.13	-	-	-	-
hsa-mir-854	-	-	-	-	-	-
hsa-mir-855	-	-	0.19	-	-	-
hsa-mir-857	-	-	-	-	-	-
hsa-mir-864	-	-	-	-	-	-
hsa-mir-867	-	-	-	-	-	0.04
hsa-mir-869	-	-	-	-	-	-
hsa-mir-871	-	-	0.09	-	-	-
hsa-mir-883	-	-	-	-	-	-
hsa-mir-884	-	-	-	-	-	-
hsa-mir-885	-	-	-	-	-	-
hsa-mir-886	-	-	-	-	0.05	-
hsa-mir-887	-	-	-	-	-	-
hsa-mir-888	-	-	-	-	-	-
hsa-mir-889	-	-	-	-	-	-
hsa-mir-890	-	-	-	-	0.05	-
hsa-mir-891	-	-	-	-	-	-
hsa-mir-892	-	-	-	-	-	-
hsa-mir-893	-	-	-	-	-	-
hsa-mir-894	-	-	-	-	-	0.09
hsa-mir-92b	-	0.63	-	0.12	-	-

The "-" in the table indicates 0 %.

Table G1: Relative Cloning Frequency in % Relative to Total Number of Identified MicroRNA for Each Given Library.

	Adult brain			
miRNA	hsa_cerebellum	hsa_frontalcortex	hsa_midbrain	hsa_hippocampus
hsa-miR-100516	-	-	-	-
hsa-miR-100516	-	-	-	-
hsa-miR-100604	0.13	0.26	0.60	0.09
hsa-miR-100610-5p	-	-	-	-
hsa-miR-100631	-	-	-	-
hsa-miR-100732	-	-	-	-
hsa-miR-100814	-	-	-	-
hsa-miR-100815	-	0.07	0.13	0.09
hsa-miR-100818	-	-	-	-
hsa-miR-100819	0.13	0.20	-	-
hsa-miR-100824	-	0.07	0.07	-
hsa-miR-100825-3p	-	-	-	-
hsa-miR-100825-5p	-	-	-	-
hsa-miR-100829-3p	-	-	-	-
hsa-miR-100835-5p	-	-	-	-
hsa-miR-100842	-	-	-	-
hsa-miR-100843-3p	-	0.07	-	0.26
hsa-miR-100843-5p	-	0.07	-	0.26
hsa-miR-100846	-	-	0.07	-
hsa-miR-100851	-	-	-	-
hsa-miR-100852	-	-	-	-
hsa-miR-100854	0.25	-	-	0.09
hsa-miR-100855-3p	-	0.13	-	0.09
hsa-miR-100855-5p	-	0.13	-	0.09
hsa-miR-100869-3p	-	-	-	-
hsa-miR-100869-5p	-	-	-	-
hsa-miR-100871-3p	-	-	-	-
hsa-miR-100871-5p	-	-	-	-
hsa-miR-100885	-	-	-	-
hsa-miR-100885	-	-	-	-
hsa-miR-100887-3p	-	-	-	-
hsa-miR-100887-3p	-	-	-	-
hsa-miR-100887-5p	-	-	-	-
hsa-miR-100887-5p	-	-	-	-
hsa-miR-100891-3p	-	-	-	-
hsa-miR-100891-3p	-	-	-	-
hsa-miR-100891-5p	-	-	-	-
hsa-miR-100891-5p	-	-	-	-
hsa-miR-101001	-	-	-	-
hsa-miR-146b	-	-	-	-
hsa-miR-147b	-	-	-	-
hsa-miR-181d	-	0.03	-	-
hsa-miR-18b	-	-	-	-
hsa-mir-18b-3p	-	-	-	-
hsa-miR-193b	-	-	-	-
hsa-miR-20b	-	-	-	-
hsa-miR-20b-3p	-	-	-	-
hsa-miR-216b	-	-	-	-
hsa-miR-301b	-	-	-	-
hsa-miR-329	-	-	0.07	-
hsa-miR-33b	-	-	-	0.09
hsa-miR-374b	-	-	0.07	0.26
hsa-miR-375	-	-	-	-

	Adult brain			
miRNA	hsa_cerebellum	hsa_frontalcortex	hsa_midbrain	hsa_hippocampus
hsa-miR-376a	-	-	-	-
hsa-miR-376b	-	-	-	-
hsa-miR-376c	-	0.07	0.07	-
hsa-miR-376c	-	0.07	0.07	-
hsa-miR-377	-	0.07	-	0.26
hsa-miR-378	-	-	0.07	-
hsa-miR-379	-	0.13	0.27	0.43
hsa-miR-380	-	-	-	-
hsa-miR-410	-	-	0.07	-
hsa-miR-421-3p	-	-	-	0.09
hsa-miR-429	-	-	-	-
hsa-miR-431	-	0.13	-	-
hsa-miR-432	-	-	0.07	-
hsa-miR-433	-	-	0.07	-
hsa-miR-449a	-	-	-	-
hsa-miR-449b	-	-	-	-
hsa-miR-450a	-	-	-	-
hsa-miR-451	0.13	0.52	0.87	-
hsa-miR-452	-	-	-	-
hsa-miR-453	-	-	-	-
hsa-miR-454	0.13	-	0.07	-
hsa-miR-455-5p	-	-	-	-
hsa-miR-484	-	-	-	-
hsa-miR-485-3p	-	-	-	0.09
hsa-miR-485-5p	-	-	-	0.09
hsa-mir-486_ os	-	-	-	-
hsa-miR-487	-	-	0.07	-
hsa-miR-488	0.51	-	-	0.69
hsa-miR-490	-	-	-	-
hsa-miR-493	-	-	-	-
hsa-miR-497	-	-	-	-
hsa-miR-502	-	-	-	-
hsa-miR-503	-	-	-	-
hsa-miR-505	0.13	-	-	-
hsa-miR-509-3p	-	-	-	-
hsa-miR-514	-	-	-	-
hsa-miR-544	-	-	-	-
hsa-miR-618	-	-	-	-
hsa-miR-619	-	-	-	-
hsa-miR-620	-	-	-	-
hsa-mir-816	-	-	-	-
hsa-mir-817	-	-	-	-
hsa-mir-828-3p	-	0.13	-	-
hsa-mir-828-5p	-	-	0.07	-
hsa-mir-831-1	-	-	-	-
hsa-mir-840-3p	-	-	-	-
hsa-mir-840-5p	-	-	0.13	-
hsa-mir-847	-	-	-	-
hsa-mir-848	-	-	-	-
hsa-mir-849	-	-	-	-
hsa-mir-850	0.13	-	-	-
hsa-mir-853	-	-	-	-
hsa-mir-857	-	-	-	-
hsa-miR-92b	-	0.07	0.07	-

	Medulloblastoma	Glioblastoma	Neuroblastoma		
miRNA	hsa_DAOY	hsa_SNB19	BE(2)-M17	hsa_SH-SY5Y	SH-SY5Y_retinoic acid
hsa-miR-100516	0.23	-	-	-	-
hsa-miR-100516	0.23	-	-	-	-
hsa-miR-100604	-	-	-	1.61	0.94
hsa-miR-100610-5p	-	-	-	-	-
hsa-miR-100631	-	-	-	-	-
hsa-miR-100732	-	-	-	-	-
hsa-miR-100814	-	-	0.30	0.32	0.67
hsa-miR-100815	-	0.20	-	0.48	0.40
hsa-miR-100818	-	-	-	-	-
hsa-miR-100819	-	-	-	-	-
hsa-miR-100824	-	-	-	-	-
hsa-miR-100825-3p	-	-	-	-	-
hsa-miR-100825-5p	-	-	-	-	-
hsa-miR-100829-3p	-	-	-	-	-
hsa-miR-100835-5p	-	-	-	-	-
hsa-miR-100842	-	-	0.15	0.16	-
hsa-miR-100843-3p	0.46	0.20	0.76	1.61	1.89
hsa-miR-100843-5p	0.46	0.20	0.76	1.61	1.89
hsa-miR-100846	-	-	-	-	0.13
hsa-miR-100851	-	-	-	-	0.13
hsa-miR-100852	-	0.20	-	-	-
hsa-miR-100854	-	-	0.15	-	-
hsa-miR-100855-3p	-	-	-	-	-
hsa-miR-100855-5p	-	-	-	-	-
hsa-miR-100859-3p	-	-	0.15	-	-
hsa-miR-100859-5p	-	-	0.15	-	-
hsa-miR-100871-3p	0.23	0.20	-	-	-
hsa-miR-100871-5p	0.23	0.20	-	-	-
hsa-miR-100885	-	-	-	-	-
hsa-miR-100885	-	-	-	-	-
hsa-miR-100887-3p	-	-	-	-	-
hsa-miR-100887-3p	-	-	-	-	-
hsa-miR-100887-5p	-	-	-	-	-
hsa-miR-100887-5p	-	-	-	-	-
hsa-miR-100891-3p	-	-	-	-	-
hsa-miR-100891-3p	-	-	-	-	-
hsa-miR-100891-5p	-	-	-	-	-
hsa-miR-100891-5p	-	-	-	-	-
hsa-miR-101001	-	-	0.15	-	-
hsa-miR-146b	0.11	-	-	-	-
hsa-miR-147b	0.23	-	-	-	-
hsa-miR-181d	-	-	-	-	0.13
hsa-miR-18b	0.11	-	-	-	-
hsa-mir-18b-3p	0.11	-	-	-	-
hsa-miR-193b	-	-	-	-	-
hsa-miR-20b	-	-	-	-	-
hsa-miR-20b-3p	-	-	-	-	-
hsa-miR-216b	-	-	-	-	-
hsa-miR-301b	-	-	0.61	0.32	0.74
hsa-miR-329	-	-	-	-	-
hsa-miR-33b	-	0.40	-	-	-
hsa-miR-374b	-	0.60	-	0.88	-
hsa-miR-375	-	-	0.15	0.16	-

	Medulloblastoma	Glioblastoma	Neuroblastoma		
miRNA	hsa_DAOY	hsa_SNB19	BE(2)-M17	hsa_SH-SY5Y	SH-SY5Y_retinoic acid
hsa-miR-376a	-	-	-	-	-
hsa-miR-376b	-	-	0.30	-	-
hsa-miR-376c	-	-	-	-	-
hsa-miR-376c	-	-	-	-	-
hsa-miR-377	-	-	1.98	-	-
hsa-miR-378	-	-	-	-	-
hsa-miR-379	-	-	1.57	-	-
hsa-miR-380	-	-	-	-	-
hsa-miR-410	-	-	0.30	-	-
hsa-miR-421-3p	-	-	-	-	-
hsa-miR-429	-	-	-	-	-
hsa-miR-431	-	-	0.46	-	-
hsa-miR-432	0.23	-	0.15	-	-
hsa-miR-433	-	-	-	-	-
hsa-miR-449a	-	-	-	-	-
hsa-miR-449b	-	-	-	-	-
hsa-miR-450a	-	-	0.15	-	-
hsa-miR-451	-	-	-	-	-
hsa-miR-452	-	-	-	-	-
hsa-miR-453	-	-	0.15	-	-
hsa-miR-454	-	-	0.15	-	-
hsa-miR-455-5p	-	-	-	-	-
hsa-miR-484	-	-	-	-	-
hsa-miR-485-3p	-	-	-	-	-
hsa-miR-485-5p	-	-	-	-	-
hsa-mir-486_ .os	-	-	-	-	-
hsa-miR-487	-	-	0.30	-	-
hsa-miR-488	-	-	-	0.64	0.40
hsa-miR-490	-	-	0.61	0.32	0.40
hsa-miR-493	-	-	0.91	-	-
hsa-miR-497	-	-	-	-	-
hsa-miR-502	-	-	-	-	-
hsa-miR-503	0.23	-	0.91	-	-
hsa-miR-505	-	-	-	-	-
hsa-miR-509-3p	-	-	-	-	-
hsa-miR-514	-	-	-	-	-
hsa-miR-544	-	-	0.15	-	-
hsa-miR-618	-	-	-	-	-
hsa-miR-619	-	-	-	-	-
hsa-miR-620	-	-	-	-	-
hsa-mir-816	-	-	-	-	-
hsa-mir-817	-	-	-	-	0.13
hsa-mir-828-3p	-	-	-	-	-
hsa-mir-828-5p	-	-	-	-	-
hsa-mir-831-1	-	-	-	-	-
hsa-mir-840-3p	-	-	-	0.32	0.40
hsa-mir-840-5p	0.23	0.40	0.15	0.96	0.54
hsa-mir-847	-	-	-	-	-
hsa-mir-848	-	-	-	-	-
hsa-mir-849	-	-	-	-	-
hsa-mir-850	-	-	-	-	-
hsa-mir-853	-	-	-	0.32	-
hsa-mir-857	-	-	-	0.32	0.27
hsa-miR-92b	-	-	-	-	-

	Skin	Liver	Hepatocellular carcinoma			Hepatoblastoma	
miRNA	fibroblasts_CMV	hsa_liver	Huh7_HCV	Huh7_Mock	hsa_PLC	hsa_HepG2	hsa_HepG2_2215
hsa-miR-100516	-	-	-	-	-	-	-
hsa-miR-100516	-	-	-	-	-	-	-
hsa-miR-100604	0.60	-	-	0.52	0.22	0.07	-
hsa-miR-100610-5p	-	-	1.67	-	-	-	0.06
hsa-miR-100631	-	-	-	-	-	-	-
hsa-miR-100732	-	-	-	-	-	-	-
hsa-miR-100814	-	-	-	-	-	-	-
hsa-miR-100815	-	-	-	-	-	0.15	-
hsa-miR-100818	-	-	-	-	-	0.07	-
hsa-miR-100819	-	0.07	-	-	-	-	-
hsa-miR-100824	-	-	-	-	-	-	-
hsa-miR-100825-3p	-	-	-	-	-	-	-
hsa-miR-100825-5p	-	-	-	-	-	-	-
hsa-miR-100829-3p	-	-	-	-	-	-	-
hsa-miR-100835-5p	-	-	-	-	-	-	-
hsa-miR-100842	-	-	-	-	-	0.07	-
hsa-miR-100843-3p	0.20	-	-	-	-	-	-
hsa-miR-100843-5p	0.20	-	-	-	-	-	-
hsa-miR-100846	-	-	-	-	-	-	-
hsa-miR-100851	-	-	-	-	-	-	-
hsa-miR-100852	-	-	-	-	0.29	-	0.06
hsa-miR-100854	-	0.07	-	-	-	-	-
hsa-miR-100855-3p	-	-	-	-	-	0.15	0.13
hsa-miR-100855-5p	-	-	-	-	-	0.15	0.13
hsa-miR-100869-3p	-	-	-	-	-	-	-
hsa-miR-100869-5p	-	-	-	-	-	-	-
hsa-miR-100871-3p	-	-	-	0.26	-	-	-
hsa-miR-100871-5p	-	-	-	0.26	-	-	-
hsa-miR-100885	-	-	-	-	-	-	-
hsa-miR-100885	-	-	-	-	-	-	-
hsa-miR-100887-3p	-	-	-	-	-	-	-
hsa-miR-100887-3p	-	-	-	-	-	-	-
hsa-miR-100887-5p	-	-	-	-	-	-	-
hsa-miR-100887-5p	-	-	-	-	-	-	-
hsa-miR-100891-3p	-	-	-	-	-	-	-
hsa-miR-100891-3p	-	-	-	-	-	-	-
hsa-miR-100891-5p	-	-	-	-	-	-	-
hsa-miR-100891-5p	-	-	-	-	-	-	-
hsa-miR-101001	-	-	-	-	-	-	-
hsa-miR-146b	-	-	-	-	-	-	-
hsa-miR-147b	0.40	-	-	-	-	-	-
hsa-miR-181d	-	-	-	-	-	-	-
hsa-miR-18b	-	-	-	-	-	0.11	0.03
hsa-mir-18b-3p	-	-	-	-	-	0.11	0.03
hsa-miR-193b	0.20	0.07	-	0.26	0.07	0.07	0.06
hsa-miR-20b	-	-	-	-	-	-	-
hsa-miR-20b-3p	-	-	-	-	-	-	-
hsa-miR-216b	-	-	-	-	-	-	-
hsa-miR-301b	-	-	-	-	-	0.26	0.39
hsa-miR-329	-	-	-	-	-	-	-
hsa-miR-33b	-	-	-	-	0.43	0.15	-
hsa-miR-374b	-	-	-	-	1.72	0.97	0.71
hsa-miR-375	-	-	-	-	-	-	-

	Skin	Liver	Hepatocellular carcinoma			Hepatoblastoma	
miRNA	fibroblasts_CMV	hsa_liver	Huh7_HCV	Huh7_Mock	hsa_PLC	hsa_HepG2	hsa_HepG2_2215
hsa-miR-376a	0.20	-	-	-	-	-	-
hsa-miR-376b	-	-	-	-	-	-	-
hsa-miR-376c	-	-	-	-	-	-	-
hsa-miR-376c	-	-	-	-	-	-	-
hsa-miR-377	-	0.07	-	-	-	-	-
hsa-miR-378	-	0.07	-	0.26	-	0.07	0.06
hsa-miR-379	1.00	-	-	-	-	-	-
hsa-miR-380	-	-	-	-	-	-	-
hsa-miR-410	-	-	-	-	-	-	-
hsa-miR-421-3p	-	-	-	0.26	0.29	-	-
hsa-miR-429	-	-	-	-	-	-	0.13
hsa-miR-431	-	-	-	-	-	-	-
hsa-miR-432	0.20	-	-	-	-	-	-
hsa-miR-433	-	-	-	-	-	-	-
hsa-miR-449a	-	-	-	-	-	-	-
hsa-miR-449b	-	-	-	-	-	-	-
hsa-miR-450a	-	-	-	-	0.07	-	-
hsa-miR-451	-	0.57	-	-	-	-	-
hsa-miR-452	-	-	-	-	-	0.07	0.06
hsa-miR-453	-	-	-	-	-	-	-
hsa-miR-454	0.20	-	-	-	0.07	0.07	-
hsa-miR-455-5p	-	-	-	-	-	0.60	0.26
hsa-miR-484	-	-	-	-	-	0.07	0.06
hsa-miR-485-3p	-	-	-	-	-	-	-
hsa-miR-485-5p	-	-	-	-	-	-	-
hsa-mir-486__os	-	-	-	-	-	-	-
hsa-miR-487	-	-	-	-	-	-	-
hsa-miR-488	-	-	-	-	-	-	-
hsa-miR-490	-	-	-	-	-	-	-
hsa-miR-493	0.20	-	-	-	-	-	-
hsa-miR-497	-	-	-	-	-	-	0.06
hsa-miR-502	-	-	-	-	-	-	-
hsa-miR-503	0.20	-	-	-	-	-	-
hsa-miR-505	-	0.07	-	-	0.07	0.07	0.06
hsa-miR-509-3p	-	-	-	-	-	-	-
hsa-miR-514	-	-	-	-	-	-	-
hsa-miR-544	-	-	-	-	-	-	-
hsa-miR-518	-	-	-	-	-	-	-
hsa-miR-519	-	-	-	-	-	-	-
hsa-miR-620	-	-	-	-	-	-	-
hsa-mir-816	-	-	-	-	0.07	-	-
hsa-mir-817	-	0.07	-	-	-	-	-
hsa-mir-828-3p	-	-	-	-	-	-	-
hsa-mir-828-5p	-	-	-	-	-	-	-
hsa-mir-831-1	-	-	-	-	-	-	-
hsa-mir-840-3p	-	-	-	-	0.07	-	-
hsa-mir-840-5p	-	-	-	0.26	0.22	0.37	0.71
hsa-mir-847	-	-	-	-	-	-	-
hsa-mir-848	0.40	-	-	-	-	-	-
hsa-mir-849	-	-	-	-	-	-	-
hsa-mir-850	0.20	-	-	-	-	-	-
hsa-mir-853	-	-	-	-	-	-	-
hsa-mir-857	-	-	-	-	-	-	-
hsa-miR-92b	-	-	-	-	0.04	-	-

	Heart	Spleen	T-cells		B-cells	precursor B-ALL		
miRNA	hsa heart	hsa spleen	hsa_CD4	hsa_CD8	hsa_CD19	hsa_B-ALL2_d0	hsa_B-ALL3_d0	hsa_B-ALL4_d0
hsa-miR-100516	-	-	-	-	-	-	-	-
hsa-miR-100516	-	-	-	-	-	-	-	-
hsa-miR-100604	-	0.18	-	0.16	-	-	-	0.10
hsa-miR-100610-5p	-	-	-	-	-	-	-	-
hsa-miR-100631	-	-	-	-	-	-	-	-
hsa-miR-100732	-	-	-	-	-	-	-	-
hsa-miR-100814	-	-	-	-	-	-	-	-
hsa-miR-100815	-	-	0.14	-	-	0.15	0.12	-
hsa-miR-100818	-	-	-	-	-	-	-	-
hsa-miR-100819	-	-	-	-	-	-	-	-
hsa-miR-100824	-	-	-	-	-	-	-	-
hsa-miR-100825-3p	-	-	-	-	-	-	-	-
hsa-miR-100825-5p	-	-	-	-	-	-	-	-
hsa-miR-100829-3p	-	-	-	-	-	-	-	-
hsa-miR-100835-5p	-	-	-	0.16	-	-	-	-
hsa-miR-100842	-	-	0.14	0.16	-	-	-	0.10
hsa-miR-100843-3p	-	-	-	-	-	-	0.12	0.10
hsa-miR-100843-5p	-	-	-	-	-	-	0.12	0.10
hsa-miR-100846	-	-	-	-	-	-	-	-
hsa-miR-100851	-	-	-	-	-	-	-	-
hsa-miR-100852	-	-	-	-	-	-	-	-
hsa-miR-100854	-	-	-	0.16	-	-	-	-
hsa-miR-100855-3p	-	0.18	-	-	-	-	-	-
hsa-miR-100855-5p	-	0.18	-	-	-	-	-	-
hsa-miR-100869-3p	-	-	-	-	-	-	-	-
hsa-miR-100869-5p	-	-	-	-	-	-	-	-
hsa-miR-100871-3p	-	-	-	-	-	-	-	-
hsa-miR-100871-5p	-	-	-	-	-	-	-	-
hsa-miR-100885	-	-	-	-	-	-	-	-
hsa-miR-100885	-	-	-	-	-	-	-	-
hsa-miR-100887-3p	-	-	-	-	-	-	-	-
hsa-miR-100887-3p	-	-	-	-	-	-	-	-
hsa-miR-100887-5p	-	-	-	-	-	-	-	-
hsa-miR-100887-5p	-	-	-	-	-	-	-	-
hsa-miR-100891-3p	-	-	-	-	-	-	-	-
hsa-miR-100891-3p	-	-	-	-	-	-	-	-
hsa-miR-100891-5p	-	-	-	-	-	-	-	-
hsa-miR-100891-5p	-	-	-	-	-	-	-	-
hsa-miR-101001	-	-	-	-	-	-	-	-
hsa-miR-146b	-	-	0.21	-	-	-	-	0.10
hsa-miR-147b	-	-	-	-	-	-	-	-
hsa-miR-181d	-	-	-	-	-	-	-	-
hsa-miR-18b	-	-	-	-	-	-	-	0.10
hsa-mir-18b-3p	-	-	-	-	-	-	-	0.10
hsa-miR-193b	-	0.18	-	-	-	-	-	-
hsa-miR-20b	-	-	-	-	-	-	-	0.10
hsa-miR-20b-3p	-	-	-	-	-	-	-	0.10
hsa-miR-216b	-	-	-	-	-	-	-	0.05
hsa-miR-301b	-	-	-	-	-	-	-	-
hsa-miR-329	-	-	-	-	-	-	-	-
hsa-miR-33b	-	-	-	-	-	-	-	-
hsa-miR-374b	-	-	-	0.48	-	0.45	-	0.10
hsa-miR-375	-	0.18	-	0.16	-	-	-	-

	Heart	Spleen	T-cells		B-cells	precursor B-ALL		
miRNA	hsa_heart	hsa_spleen	hsa_CD4	hsa_CD8	hsa_CD19	hsa_B-ALL2_d0	hsa_B-ALL3_d0	hsa_B-ALL4_d0
hsa-miR-376a	-	-	-	-	-	-	-	-
hsa-miR-376b	-	-	-	-	-	-	-	-
hsa-miR-376c	-	-	-	-	-	-	-	-
hsa-miR-376c	-	-	-	-	-	-	-	-
hsa-miR-377	-	-	-	-	-	-	-	-
hsa-miR-378	-	-	-	-	-	-	-	0.10
hsa-miR-379	-	-	-	-	-	-	-	-
hsa-miR-380	-	-	-	-	-	-	-	-
hsa-miR-410	-	-	-	-	-	-	-	-
hsa-miR-421-3p	-	-	-	-	-	-	-	-
hsa-miR-429	-	-	-	-	-	-	-	-
hsa-miR-431	-	-	-	-	-	-	-	-
hsa-miR-432	-	-	-	-	-	-	-	-
hsa-miR-433	-	-	-	-	-	-	-	-
hsa-miR-449a	-	-	-	-	-	-	-	-
hsa-miR-449b	-	-	-	-	-	-	-	-
hsa-miR-450a	-	-	-	-	-	-	-	-
hsa-miR-451	1.68	0.18	-	-	0.30	-	0.25	0.20
hsa-miR-452	-	-	-	-	-	-	-	-
hsa-miR-453	-	-	-	-	-	-	-	-
hsa-miR-454	-	-	-	0.16	-	-	0.12	0.10
hsa-miR-455-5p	-	-	-	-	-	-	-	-
hsa-miR-484	-	-	-	-	-	-	-	-
hsa-miR-485-3p	-	-	-	-	-	-	-	-
hsa-miR-485-5p	-	-	-	-	-	-	-	-
hsa-mir-486_ _os	-	-	-	-	-	-	-	-
hsa-miR-487	-	-	-	-	-	-	-	-
hsa-miR-488	-	-	-	-	-	-	-	-
hsa-miR-490	-	-	-	-	-	-	-	-
hsa-miR-493	-	-	-	-	-	-	-	-
hsa-miR-497	0.30	-	-	-	-	-	-	-
hsa-miR-502	-	-	-	-	-	-	-	-
hsa-miR-503	-	-	-	-	-	-	-	-
hsa-miR-505	-	0.18	0.14	0.16	-	-	-	-
hsa-miR-509-3p	-	-	-	-	-	-	-	-
hsa-miR-514	-	-	-	-	-	-	-	-
hsa-miR-544	-	-	-	-	-	-	-	-
hsa-miR-618	-	-	-	-	-	-	-	-
hsa-miR-619	-	-	-	-	-	-	-	-
hsa-miR-620	-	-	-	-	-	-	-	-
hsa-mir-816	-	-	-	-	-	-	-	-
hsa-mir-817	-	-	-	-	-	-	-	-
hsa-mir-828-3p	-	-	-	-	-	-	-	-
hsa-mir-828-5p	-	-	-	-	-	-	-	-
hsa-mir-831-1	-	-	-	-	-	-	-	-
hsa-mir-840-3p	-	0.18	-	-	-	-	-	-
hsa-mir-840-5p	-	-	-	-	-	-	-	-
hsa-mir-847	-	-	-	-	-	-	-	-
hsa-mir-848	-	-	-	-	-	-	-	-
hsa-mir-849	-	-	-	-	-	-	-	-
hsa-mir-850	-	-	-	-	-	-	-	-
hsa-mir-853	-	0.18	-	-	-	-	-	-
hsa-mir-857	-	-	-	-	-	0.15	-	-
hsa-miR-92b	-	0.36	-	-	-	-	-	-

	T-ALL			T-ALL in remission	AML				
miRNA	hsa_jurk	hsa_T-ALL3_d0	hsa_T-ALL4_d0	hsa_T-ALL4 d29	hsa_Kas1	hsa_HL60	hsa_AML1_d0	hsa_AML2_d0	hsa_AML3_d0
hsa-miR-100516	-	-	-	-	-	-	-	-	-
hsa-miR-100516	-	-	-	-	-	-	-	-	-
hsa-miR-100604	-	-	-	0.65	-	0.28	0.10	0.14	0.15
hsa-miR-100610-5p	-	0.15	-	-	-	-	0.10	-	0.15
hsa-miR-100631	-	-	-	-	-	-	-	-	-
hsa-miR-100732	-	-	-	-	-	-	-	-	-
hsa-miR-100814	-	-	-	-	-	-	-	-	-
hsa-miR-100815	-	0.36	0.26	0.41	-	-	0.29	0.14	-
hsa-miR-100818	0.17	-	-	-	-	-	-	-	-
hsa-miR-100819	-	-	-	-	-	-	-	-	-
hsa-miR-100824	-	-	-	-	-	-	-	-	-
hsa-miR-100825-3p	-	0.07	-	-	-	-	-	-	-
hsa-miR-100825-5p	-	0.07	-	-	-	-	-	-	-
hsa-miR-100829-3p	-	-	-	-	-	-	-	-	-
hsa-miR-100835-5p	-	-	-	-	-	-	-	-	-
hsa-miR-100842	0.17	-	-	-	-	-	-	-	-
hsa-miR-100843-3p	-	-	-	0.08	-	-	-	-	-
hsa-miR-100843-5p	-	-	-	0.08	-	-	-	-	-
hsa-miR-100846	-	-	-	-	-	-	-	-	-
hsa-miR-100851	-	-	-	-	-	-	-	-	-
hsa-miR-100852	-	-	-	-	-	-	-	-	-
hsa-miR-100854	-	-	-	-	-	-	-	-	-
hsa-miR-100855-3p	-	0.15	-	0.16	-	-	0.20	-	-
hsa-miR-100855-5p	-	0.15	-	0.16	-	-	0.20	-	-
hsa-miR-100869-3p	-	-	-	-	-	-	-	-	-
hsa-miR-100869-5p	-	-	-	-	-	-	-	-	-
hsa-miR-100871-3p	-	-	-	-	-	-	-	-	-
hsa-miR-100871-5p	-	-	-	-	-	-	-	-	-
hsa-miR-100885	-	-	-	-	-	-	-	-	-
hsa-miR-100885	-	-	-	-	-	-	-	-	-
hsa-miR-100887-3p	-	-	-	-	-	-	-	-	-
hsa-miR-100887-3p	-	-	-	-	-	-	-	-	-
hsa-miR-100887-5p	-	-	-	-	-	-	-	-	-
hsa-miR-100887-5p	-	-	-	-	-	-	-	-	-
hsa-miR-100891-3p	-	-	-	-	-	-	-	-	-
hsa-miR-100891-3p	-	-	-	-	-	-	-	-	-
hsa-miR-100891-5p	-	-	-	-	-	-	-	-	-
hsa-miR-100891-5p	-	-	-	-	-	-	-	-	-
hsa-miR-101001	-	-	-	-	-	-	-	-	-
hsa-miR-146b	-	-	-	-	-	-	-	-	-
hsa-miR-147b	-	-	-	-	-	-	-	-	-
hsa-miR-181d	-	-	-	-	-	-	-	-	-
hsa-miR-18b	-	0.07	-	-	-	-	0.20	-	-
hsa-mir-18b-3p	-	0.07	-	-	-	-	0.20	-	-
hsa-miR-193b	-	-	-	-	-	-	-	-	-
hsa-miR-20b	-	-	-	-	-	-	-	-	-
hsa-miR-20b-3p	-	-	-	-	-	-	-	-	-
hsa-miR-216b	-	-	-	-	-	-	-	0.07	-
hsa-miR-301b	0.67	0.07	-	-	0.71	-	-	-	-
hsa-miR-329	-	-	-	-	-	-	-	-	-
hsa-miR-33b	-	-	0.26	-	-	-	-	-	-
hsa-miR-374b	-	-	-	0.16	0.71	0.28	0.10	-	-
hsa-miR-375	-	-	-	-	-	-	-	0.14	-

	T-ALL			T-ALL in remission	AML				
miRNA	hsa_jurk	hsa_T-ALL3_d0	hsa_T-ALL4_d0	hsa_T-ALL4_d29	hsa_Kas1	hsa_HL60	hsa_AML1_d0	hsa_AML2_d0	hsa_AML3_d0
hsa-miR-376a	-	-	-	-	-	-	-	-	-
hsa-miR-376b	-	-	-	-	-	-	-	-	-
hsa-miR-376c	-	-	-	-	-	-	-	-	-
hsa-miR-376c	-	-	-	-	-	-	-	-	-
hsa-miR-377	-	-	-	-	-	-	-	-	-
hsa-miR-378	-	0.07	0.78	0.08	-	0.56	-	-	-
hsa-miR-379	-	-	0.78	0.08	-	-	-	0.14	-
hsa-miR-380	-	-	-	0.08	-	-	-	-	-
hsa-miR-410	-	-	-	-	-	-	-	-	-
hsa-miR-421-3p	-	-	-	-	-	-	-	-	-
hsa-miR-429	-	-	-	-	-	-	-	-	-
hsa-miR-431	-	-	-	-	-	-	-	-	-
hsa-miR-432	-	-	-	-	-	-	-	-	-
hsa-miR-433	-	-	-	-	-	-	-	-	-
hsa-miR-449a	-	-	-	-	-	-	-	-	-
hsa-miR-449b	-	0.07	-	-	-	-	-	-	-
hsa-miR-450a	-	-	-	-	-	-	-	-	-
hsa-miR-451	-	-	-	-	-	-	-	-	0.31
hsa-miR-452	-	-	-	-	-	-	-	-	-
hsa-miR-453	-	-	-	-	-	-	-	-	-
hsa-miR-454	0.17	-	-	-	-	-	-	-	-
hsa-miR-455-5p	-	-	-	0.08	-	-	-	-	-
hsa-miR-484	-	-	-	-	-	-	-	0.14	-
hsa-miR-485-3p	-	-	-	-	-	-	-	-	-
hsa-miR-485-5p	-	-	-	-	-	-	-	-	-
hsa-mir-486__os	-	-	-	-	-	-	-	-	-
hsa-miR-487	-	-	-	-	-	-	-	-	-
hsa-miR-488	-	-	-	-	-	-	-	-	-
hsa-miR-490	-	-	-	-	-	-	-	-	-
hsa-miR-493	-	-	-	-	-	-	-	-	-
hsa-miR-497	-	0.22	0.26	0.08	-	-	0.20	0.14	-
hsa-miR-502	-	-	-	-	-	-	-	-	-
hsa-miR-503	-	0.07	-	0.24	-	-	0.29	-	-
hsa-miR-505	-	-	-	-	-	-	-	-	-
hsa-miR-509-3p	-	-	-	-	-	-	0.10	-	-
hsa-miR-514	-	-	-	-	-	-	-	-	-
hsa-miR-544	-	-	-	-	-	-	-	-	-
hsa-miR-618	-	-	-	-	-	-	-	-	-
hsa-miR-619	-	-	-	-	-	-	-	-	-
hsa-miR-620	-	-	-	-	-	-	-	-	-
hsa-mir-816	-	-	-	-	-	-	-	-	-
hsa-mir-817	-	-	-	-	-	-	-	-	-
hsa-mir-828-3p	-	-	-	-	-	-	-	-	-
hsa-mir-828-5p	-	-	-	-	-	-	-	-	-
hsa-mir-831-1	-	-	-	-	-	-	-	-	-
hsa-mir-840-3p	-	-	-	-	-	-	-	-	-
hsa-mir-840-5p	-	-	-	-	-	-	-	0.27	-
hsa-mir-847	-	-	-	-	-	-	-	-	-
hsa-mir-848	-	-	-	-	-	-	-	-	-
hsa-mir-849	-	-	-	-	-	-	-	-	-
hsa-mir-850	-	-	-	-	-	-	-	-	-
hsa-mir-853	-	-	-	-	-	-	-	-	-
hsa-mir-857	-	-	-	-	-	-	-	-	-
hsa-miR-92b	-	-	-	-	-	-	-	-	-

	Endocrine organs							Unrestricted somatic stem cells
miRNA	hsa_pituitary	SW13	SW13_YFV	hsa_ovary	hsa_testis	hsa_thyroid	hsa_pancreatic_islet	hsa_USSC_d1
hsa-miR-100516	-	-	-	-	-	-	-	-
hsa-miR-100516	-	-	-	-	-	-	-	-
hsa-miR-100604	0.06	-	-	0.23	0.15	-	-	-
hsa-miR-100610-5p	-	0.13	0.12	-	0.07	-	-	-
hsa-miR-100631	-	-	-	-	-	-	-	-
hsa-miR-100732	-	-	-	-	-	-	-	0.07
hsa-miR-100814	-	-	-	-	-	-	-	-
hsa-miR-100815	0.06	-	-	-	-	-	0.09	-
hsa-miR-100818	-	-	-	-	-	-	-	0.07
hsa-miR-100819	-	-	-	-	-	-	-	-
hsa-miR-100824	-	-	-	-	-	-	-	-
hsa-miR-100825-3p	0.18	-	-	-	-	-	-	-
hsa-miR-100825-5p	0.18	-	-	-	-	-	-	-
hsa-miR-100829-3p	-	-	0.24	-	-	-	-	-
hsa-miR-100835-5p	-	0.27	-	-	-	-	-	-
hsa-miR-100842	-	-	-	-	-	-	-	-
hsa-miR-100843-3p	0.06	-	-	0.46	-	-	-	-
hsa-miR-100843-5p	0.06	-	-	0.46	-	-	-	-
hsa-miR-100846	-	-	-	-	-	-	-	-
hsa-miR-100851	-	-	-	-	-	-	-	-
hsa-miR-100852	-	-	-	-	-	-	-	-
hsa-miR-100854	-	-	-	0.08	-	-	-	-
hsa-miR-100855-3p	0.12	-	-	0.53	0.51	-	0.19	0.07
hsa-miR-100855-5p	0.12	-	-	0.53	0.51	-	0.19	0.07
hsa-miR-100869-3p	-	-	-	-	-	-	-	0.07
hsa-miR-100869-5p	-	-	-	-	-	-	-	0.07
hsa-miR-100871-3p	-	0.13	-	-	-	-	-	0.14
hsa-miR-100871-5p	-	0.13	-	-	-	-	-	0.14
hsa-miR-100885	-	0.13	0.24	-	-	-	0.09	-
hsa-miR-100885	-	0.13	0.24	-	-	-	0.09	-
hsa-miR-100887-3p	-	-	0.12	-	-	-	-	-
hsa-miR-100887-3p	-	-	0.12	-	-	-	-	-
hsa-miR-100887-5p	-	-	0.12	-	-	-	-	-
hsa-miR-100887-5p	-	-	0.12	-	-	-	-	-
hsa-miR-100891-3p	-	-	-	-	-	-	-	-
hsa-miR-100891-3p	-	-	-	-	-	-	-	-
hsa-miR-100891-5p	-	-	-	-	-	-	-	-
hsa-miR-100891-5p	-	-	-	-	-	-	-	-
hsa-miR-101001	0.06	-	-	-	0.07	-	-	0.07
hsa-miR-146b	-	-	0.24	-	-	-	-	-
hsa-miR-147b	-	-	-	-	-	-	0.09	-
hsa-miR-181d	-	-	0.12	-	-	-	-	-
hsa-miR-18b	-	0.20	1.09	-	-	-	-	-
hsa-mir-18b-3p	-	0.20	1.09	-	-	-	-	-
hsa-miR-193b	-	-	-	0.23	-	-	-	0.07
hsa-miR-20b	-	1.87	2.91	-	-	-	-	0.04
hsa-miR-20b-3p	-	1.87	2.91	-	-	-	-	0.04
hsa-miR-216b	-	-	-	-	-	-	-	-
hsa-miR-301b	-	0.13	0.61	-	-	-	-	0.07
hsa-miR-329	0.06	-	-	-	-	-	-	-
hsa-miR-33b	-	0.13	-	-	-	-	-	-
hsa-miR-374b	0.06	0.20	-	0.08	-	-	-	0.21
hsa-miR-375	3.05	-	-	-	0.07	-	5.07	-

	Endocrine organs							Unrestricted somatic stem cells
miRNA	hsa_pituitary	SW13	SW13 YFV	hsa_ovary	hsa_testis	hsa_thyroid	hsa_pancreatic_islet	hsa_USSC_d1
hsa-miR-376a	0.18	-	-	0.08	-	-	0.09	0.07
hsa-miR-376b	-	-	-	-	-	-	0.09	0.07
hsa-miR-376c	0.18	-	-	-	-	-	0.19	0.07
hsa-miR-376c	0.18	-	-	-	-	-	0.19	0.07
hsa-miR-377	0.24	-	-	0.23	0.15	-	0.19	0.35
hsa-miR-378	0.06	0.53	0.61	-	-	-	-	-
hsa-miR-379	0.24	-	-	0.08	0.22	-	0.38	0.14
hsa-miR-380	-	-	-	-	-	-	-	-
hsa-miR-410	0.43	-	-	-	-	-	0.19	0.07
hsa-miR-421-3p	-	-	-	-	-	-	-	-
hsa-miR-429	0.12	-	-	-	-	-	0.09	-
hsa-miR-431	-	-	-	-	-	-	0.19	0.14
hsa-miR-432	0.06	-	-	-	-	-	0.09	0.14
hsa-miR-433	0.06	-	-	-	-	-	-	-
hsa-miR-449a	-	-	-	-	0.29	-	-	-
hsa-miR-449b	-	0.13	-	-	-	-	-	-
hsa-miR-450a	-	-	-	-	-	-	-	-
hsa-miR-451	1.28	-	-	0.76	0.07	1.92	-	-
hsa-miR-452	-	-	-	-	-	-	-	-
hsa-miR-453	-	-	-	-	-	-	-	-
hsa-miR-454	0.06	-	0.24	-	-	-	-	-
hsa-miR-455-5p	-	-	-	-	-	-	0.19	-
hsa-miR-484	-	-	-	-	-	-	-	-
hsa-miR-485-3p	-	-	-	-	-	-	-	0.07
hsa-miR-485-5p	-	-	-	-	-	-	-	0.07
hsa-mir-486 os	-	-	-	-	-	-	-	-
hsa-miR-487	-	-	-	-	-	-	-	-
hsa-miR-488	-	-	-	-	-	-	-	-
hsa-miR-490	-	-	-	-	-	-	-	-
hsa-miR-493	-	-	-	-	-	-	-	0.14
hsa-miR-497	-	-	-	0.15	0.15	0.52	-	-
hsa-miR-502	-	-	-	-	-	-	-	-
hsa-miR-503	0.06	-	0.12	-	0.58	-	-	-
hsa-miR-505	-	-	-	-	-	-	-	-
hsa-miR-509-3p	-	-	-	-	0.73	-	-	-
hsa-miR-514	0.12	-	-	0.15	0.58	-	-	-
hsa-miR-544	-	-	-	-	-	-	-	-
hsa-miR-618	-	-	0.24	-	-	-	-	-
hsa-miR-619	0.06	-	0.24	-	-	-	-	0.07
hsa-miR-620	-	-	-	-	-	-	-	-
hsa-mir-816	-	0.13	0.12	-	-	-	-	-
hsa-mir-817	-	-	-	-	-	-	-	-
hsa-mir-828-3p	-	-	-	-	-	-	-	-
hsa-mir-828-5p	-	-	0.12	-	-	-	-	-
hsa-mir-831-1	-	0.13	0.12	-	-	-	-	-
hsa-mir-840-3p	-	-	-	-	-	-	-	-
hsa-mir-840-5p	-	-	0.12	-	0.07	-	-	-
hsa-mir-847	-	-	-	-	-	-	-	-
hsa-mir-848	-	-	-	-	-	-	-	-
hsa-mir-849	-	-	-	-	-	-	-	-
hsa-mir-850	-	-	-	-	-	-	-	-
hsa-mir-853	-	-	-	-	-	-	-	-
hsa-mir-857	-	0.13	-	-	-	-	-	-
hsa-miR-92b	0.06	0.13	0.12	-	-	-	-	-

	Embryonal derived cell lines/tumors			Placenta	Cervix carcinoma		Epididymis	Prostate
miRNA	hsa_NT2/D1	NCCIT	hsa_Hek exp	hsa_placenta	hsa_HeLa susp	HeLa_HIV infected	hsa_epididymis	hsa_prostata
hsa-miR-100516	-	-	-	-	-	-	1.18	-
hsa-miR-100516	-	-	-	-	-	-	1.18	-
hsa-miR-100604	0.12	-	0.25	-	-	-	-	-
hsa-miR-100610-5p	0.12	-	-	0.06	-	-	0.08	0.08
hsa-miR-100631	-	-	-	-	-	-	-	-
hsa-miR-100732	-	-	-	-	-	-	-	-
hsa-miR-100814	0.12	-	-	-	-	-	-	-
hsa-miR-100815	0.12	-	0.51	-	-	-	-	-
hsa-miR-100818	-	0.73	-	-	-	-	-	-
hsa-miR-100819	-	-	-	-	-	-	-	-
hsa-miR-100824	-	-	-	-	-	-	-	-
hsa-miR-100825-3p	-	-	-	-	-	-	-	-
hsa-miR-100825-5p	-	-	-	-	-	-	-	-
hsa-miR-100829-3p	-	-	-	-	-	-	-	-
hsa-miR-100835-5p	-	-	-	-	-	1.22	-	-
hsa-miR-100842	0.12	-	-	-	-	-	-	-
hsa-miR-100843-3p	1.70	-	0.25	-	-	-	-	-
hsa-miR-100843-5p	1.70	-	0.25	-	-	-	-	-
hsa-miR-100846	-	-	-	-	-	-	-	-
hsa-miR-100851	0.12	-	-	-	-	-	-	-
hsa-miR-100852	0.35	-	-	-	-	-	-	-
hsa-miR-100854	-	-	-	-	-	-	-	-
hsa-miR-100855-3p	-	-	-	-	-	-	0.16	0.23
hsa-miR-100855-5p	-	-	-	-	-	-	0.16	0.23
hsa-miR-100869-3p	-	-	-	-	-	-	-	-
hsa-miR-100859-5p	-	-	-	-	-	-	-	-
hsa-miR-100871-3p	-	0.73	-	-	0.22	-	-	-
hsa-miR-100871-5p	-	0.73	-	-	0.22	-	-	-
hsa-miR-100855	-	-	-	0.06	-	-	-	-
hsa-miR-100885	-	-	-	0.06	-	-	-	-
hsa-miR-100887-3p	-	-	-	-	-	-	-	-
hsa-miR-100887-3p	-	-	-	-	-	-	-	-
hsa-miR-100887-5p	-	-	-	-	-	-	-	-
hsa-miR-100887-5p	-	-	-	-	-	-	-	-
hsa-miR-100891-3p	-	-	-	-	-	-	-	-
hsa-miR-100891-3p	-	-	-	-	-	-	-	-
hsa-miR-100891-5p	-	-	-	-	-	-	-	-
hsa-miR-100891-5p	-	-	-	-	-	-	-	-
hsa-miR-101001	0.12	-	-	-	-	-	-	-
hsa-miR-146b	-	-	-	-	-	-	-	-
hsa-miR-147b	-	-	-	-	-	-	-	-
hsa-miR-181d	-	-	-	-	-	-	-	-
hsa-miR-18b	-	0.73	0.13	-	-	-	-	-
hsa-mir-18b-3p	-	0.73	0.13	-	-	-	-	-
hsa-miR-193b	-	-	0.25	0.06	0.43	-	-	0.16
hsa-miR-20b	0.35	0.73	0.13	-	-	-	-	0.08
hsa-miR-20b-3p	0.35	0.73	0.13	-	-	-	-	0.08
hsa-miR-216b	-	-	-	-	-	-	-	-
hsa-miR-301b	-	-	-	-	-	-	-	-
hsa-miR-329	-	-	-	-	-	-	-	-
hsa-miR-33b	-	-	0.51	-	0.43	-	-	-
hsa-miR-374b	0.48	1.46	0.25	-	-	0.41	-	0.08
hsa-miR-375	-	-	-	-	-	-	-	0.08

	Embryonal derived cell lines/tumors			Placenta	Cervix carcinoma		Epididymis	Prostate
miRNA	hsa_NT2/D1	NCCIT	hsa_Hek_exp	hsa_placenta	hsa_HeLa_susp	HeLa_HIV infected	hsa_epididymis	hsa_prostata
hsa-miR-376a	-	-	-	0.06	-	-	-	-
hsa-miR-376b	-	-	-	-	-	-	-	-
hsa-miR-376c	-	-	-	0.06	-	-	-	-
hsa-miR-376c	-	-	-	0.06	-	-	-	-
hsa-miR-377	-	-	-	0.19	-	-	-	-
hsa-miR-378	-	-	0.25	-	-	-	-	-
hsa-miR-379	-	-	-	0.06	-	-	-	-
hsa-miR-380	-	-	-	-	-	-	-	-
hsa-miR-410	-	-	-	-	-	-	-	-
hsa-miR-421-3p	-	-	-	-	-	-	0.08	-
hsa-miR-429	-	-	-	-	-	-	-	-
hsa-miR-431	-	-	-	0.19	-	-	-	-
hsa-miR-432	-	-	-	-	-	-	-	-
hsa-miR-433	-	-	-	-	-	-	-	-
hsa-miR-449a	-	-	-	-	-	-	0.08	-
hsa-miR-449b	-	-	-	-	-	-	-	-
hsa-miR-450a	-	-	-	-	-	-	-	-
hsa-miR-451	-	-	-	0.51	-	-	0.39	0.16
hsa-miR-452	-	-	-	-	-	-	-	-
hsa-miR-453	-	-	-	-	-	-	-	-
hsa-miR-454	0.12	-	0.25	-	-	-	-	-
hsa-miR-455-5p	-	-	0.25	-	-	-	-	0.08
hsa-miR-484	-	-	-	-	-	0.41	-	-
hsa-miR-485-3p	-	-	-	-	-	-	-	-
hsa-miR-485-5p	-	-	-	-	-	-	-	-
hsa-mir-486__os	-	-	-	-	-	0.41	-	-
hsa-miR-487	-	-	-	-	-	-	-	-
hsa-miR-488	0.12	-	-	-	-	-	-	-
hsa-miR-490	-	-	-	-	-	-	-	-
hsa-miR-493	-	-	-	-	-	-	-	-
hsa-miR-497	-	-	-	-	-	-	-	0.08
hsa-miR-502	-	-	-	-	0.11	-	-	-
hsa-miR-503	-	-	0.25	0.25	-	-	-	-
hsa-miR-505	-	-	-	-	-	-	-	0.08
hsa-miR-509-3p	-	-	-	-	-	-	-	-
hsa-miR-514	-	-	-	-	-	-	-	-
hsa-miR-544	-	-	-	-	-	-	-	-
hsa-miR-618	-	-	-	-	-	-	-	-
hsa-miR-619	-	-	-	-	-	-	-	-
hsa-miR-620	-	-	-	-	-	-	-	-
hsa-mir-816	-	-	0.25	-	-	-	-	-
hsa-mir-817	-	-	-	-	-	0.82	-	-
hsa-mir-828-3p	-	-	-	-	-	-	-	-
hsa-mir-828-5p	-	-	-	-	-	-	-	-
hsa-mir-831-1	-	-	-	-	-	-	-	-
hsa-mir-840-3p	-	0.73	-	-	-	-	-	-
hsa-mir-840-5p	0.36	-	-	0.06	0.22	0.41	-	-
hsa-mir-847	-	-	-	-	-	-	-	-
hsa-mir-848	-	-	-	-	-	-	-	-
hsa-mir-849	-	-	-	-	-	-	-	-
hsa-mir-850	-	-	-	-	-	-	-	-
hsa-mir-853	-	-	-	-	-	-	-	-
hsa-mir-857	0.12	-	-	-	-	-	-	-
hsa-miR-92b	0.35	-	-	-	-	-	-	-

	Breast Carcinoma						Ewing Sarcoma
miRNA	hsa_MCF10A	hsa_MCF7	hsa_HCC38	hsa_SkBr3	hsa_BT474	hsa_T47	hsa_A673
hsa-miR-100516	-	-	-	-	-	-	-
hsa-miR-100516	-	-	-	-	-	-	-
hsa-miR-100604	0.18	-	0.18	-	0.18	0.17	-
hsa-miR-100610-5p	-	-	-	-	-	-	0.09
hsa-miR-100631	-	0.25	-	-	-	-	-
hsa-miR-100732	-	-	-	-	-	-	-
hsa-miR-100814	-	-	-	-	-	-	-
hsa-miR-100815	-	0.13	0.09	-	0.05	-	0.09
hsa-miR-100818	-	-	-	-	0.05	-	-
hsa-miR-100819	-	-	-	-	-	-	-
hsa-miR-100824	-	-	-	-	-	-	-
hsa-miR-100825-3p	-	-	-	-	-	-	-
hsa-miR-100825-5p	-	-	-	-	-	-	-
hsa-miR-100829-3p	-	-	-	-	-	-	-
hsa-miR-100835-5p	-	-	-	-	0.05	-	-
hsa-miR-100842	-	-	-	-	-	-	-
hsa-miR-100843-3p	-	0.13	-	-	0.23	-	0.09
hsa-miR-100843-5p	-	0.13	-	-	0.23	-	0.09
hsa-miR-100846	-	-	-	-	-	-	-
hsa-miR-100851	-	-	-	-	-	-	-
hsa-miR-100852	-	-	-	0.12	-	-	-
hsa-miR-100854	-	-	-	-	-	-	-
hsa-miR-100855-3p	-	-	0.18	-	-	-	-
hsa-miR-100855-5p	-	-	0.18	-	-	-	-
hsa-miR-100869-3p	-	-	-	-	-	-	-
hsa-miR-100869-5p	-	-	-	-	-	-	-
hsa-miR-100871-3p	-	-	-	-	-	-	-
hsa-miR-100871-5p	-	-	-	-	-	-	-
hsa-miR-100885	-	-	-	-	-	-	-
hsa-miR-100885	-	-	-	-	-	-	-
hsa-miR-100887-3p	-	-	-	-	-	-	-
hsa-miR-100887-3p	-	-	-	-	-	-	-
hsa-miR-100887-5p	-	-	-	-	-	-	-
hsa-miR-100887-5p	-	-	-	-	-	-	-
hsa-miR-100891-3p	-	-	-	-	-	-	0.18
hsa-miR-100891-3p	-	-	-	-	-	-	0.18
hsa-miR-100891-5p	-	-	-	-	-	-	0.18
hsa-miR-100891-5p	-	-	-	-	-	-	0.18
hsa-miR-101001	-	-	-	-	-	-	-
hsa-miR-146b	-	-	-	-	-	-	-
hsa-miR-147b	-	-	-	-	-	-	-
hsa-miR-181d	-	-	-	-	0.02	-	-
hsa-miR-18b	-	-	0.18	-	0.02	-	-
hsa-mir-18b-3p	-	-	0.18	-	0.02	-	-
hsa-miR-193b	0.09	0.25	-	0.23	0.05	0.17	0.09
hsa-miR-20b	-	-	-	-	-	-	0.03
hsa-miR-20b-3p	-	-	-	-	-	-	0.03
hsa-miR-216b	-	-	-	-	-	-	-
hsa-miR-301b	-	-	-	-	-	0.59	0.45
hsa-miR-329	-	-	-	-	-	-	-
hsa-miR-33b	0.09	0.13	0.09	-	0.60	0.08	-
hsa-miR-374b	-	-	0.18	-	0.05	0.42	0.63
hsa-miR-375	-	4.26	-	0.12	-	0.17	-

	Breast Carcinoma						Ewing Sarcoma
miRNA	hsa_MCF10A	hsa_MCF7	hsa_HCC38	hsa_SkBr3	hsa_BT474	hsa_T47	hsa_A673
hsa-miR-376a	-	-	-	-	-	-	-
hsa-miR-376b	-	-	-	-	-	-	0.09
hsa-miR-376c	-	-	-	-	-	-	-
hsa-miR-376c	-	-	-	-	-	-	-
hsa-miR-377	-	-	-	-	-	-	0.72
hsa-miR-378	0.46	-	-	0.23	0.28	-	-
hsa-miR-379	-	0.13	-	-	-	-	0.09
hsa-miR-380	-	-	-	-	-	-	-
hsa-miR-410	-	-	-	-	-	-	0.18
hsa-miR-421-3p	-	0.13	-	-	-	0.08	0.18
hsa-miR-429	-	0.25	-	-	0.09	0.25	-
hsa-miR-431	-	-	-	-	-	-	-
hsa-miR-432	-	-	-	-	-	-	-
hsa-miR-433	-	-	-	-	-	-	0.09
hsa-miR-449a	-	-	-	-	-	-	-
hsa-miR-449b	-	-	-	-	-	-	-
hsa-miR-450a	-	-	-	-	-	-	0.09
hsa-miR-451	-	-	-	-	-	-	-
hsa-miR-452	-	-	-	0.12	0.05	-	-
hsa-miR-453	-	-	-	-	-	-	-
hsa-miR-454	-	-	0.18	-	0.97	0.34	-
hsa-miR-455-5p	-	-	-	-	-	-	-
hsa-miR-484	-	-	-	-	-	0.08	-
hsa-miR-485-3p	-	-	-	-	-	-	-
hsa-miR-485-5p	-	-	-	-	-	-	-
hsa-mir-486 ...os	-	-	-	-	-	-	-
hsa-miR-487	-	-	-	-	-	-	-
hsa-miR-488	-	-	-	-	-	-	0.27
hsa-miR-490	-	-	-	-	-	-	-
hsa-miR-493	-	0.13	-	-	-	-	0.09
hsa-miR-497	-	0.13	-	-	0.05	0.08	-
hsa-miR-502	-	-	-	-	-	-	-
hsa-miR-503	-	0.50	-	-	-	-	1.53
hsa-miR-505	-	-	-	-	-	-	-
hsa-miR-509-3p	-	-	-	-	-	-	-
hsa-miR-514	-	-	-	-	-	-	-
hsa-miR-544	-	-	-	-	-	-	-
hsa-miR-618	-	-	-	-	-	-	-
hsa-miR-619	-	-	-	-	-	-	-
hsa-miR-620	-	0.25	-	-	-	-	-
hsa-mir-816	0.09	0.13	-	-	-	-	-
hsa-mir-817	-	-	-	-	-	-	-
hsa-mir-828-3p	-	-	-	-	-	-	-
hsa-mir-828-5p	-	-	-	-	-	-	-
hsa-mir-831-1	-	-	-	-	-	-	-
hsa-mir-840-3p	-	-	-	-	0.05	-	-
hsa-mir-840-5p	-	-	-	-	0.55	0.51	0.18
hsa-mir-847	-	-	-	0.23	-	-	-
hsa-mir-848	-	-	-	-	-	-	-
hsa-mir-849	-	-	-	0.23	-	-	-
hsa-mir-850	-	-	-	-	-	-	-
hsa-mir-853	-	-	-	-	-	-	0.09
hsa-mir-857	-	-	-	-	-	-	-
hsa-miR-92b	-	0.50	-	0.12	-	-	0.09

EXAMPLES

Example 1: Materials and Methods

Total RNA isolation, cloning and annotation

Small RNAs were isolated from 100-200 μg of total RNA and cloned as described previously. The annotation was based on information from GenBank (http://www.ncbi.nih.gov/Genbank/), a dataset of human tRNA sequences (http://rna.wustl.edu/GtRDB/Hs/Hs-seqs.html), a dataset of human sn/snoRNA sequences (http://mbcr.bcm.tmc.edu/smallRNA/Database, snoRNA-LBME-db at http://www-snorna.biotoul.fr/index.php and NONCODE v1 at http://noncode.bioinfo.org.cn/), the microRNA registry release version 5.1, and the repeat element annotation of version 17 of the human genome assembly from UCSC (http://genome.ucse.edu).

Cell lines and tissues

Pituitary gland was dissected 2 hours postmortal following the written consent of the person's relatives. The identity of the person was obscured for privacy reasons. The human breast cancer cell lines MCF7 and SkBr3 were gifts of Dr. Neal Rosen (Memorial Sloan-Kettering Cancer Center, NY), and were maintained in 1:1 mixture of DME:F12 medium supplemented with 100 units/ml penicillin, 100 μg/ml streptomycin, 4 mM glutamine, and 10% heat inactivated fetal bovine serum, and incubated at 37°C in 5% CO2. The human neuroblastoma cell line BE(2)-M17 (ATCC:CRL-2267) was maintained in 1:1 mixture of OptiMem:F12 medium supplemented with non essential amino acids, 10% heat inactivated fetal bovine serum, and incubated at 37°C in 5% CO_2.

Example 2: Prediction of novel miRNA genes

We predicted microRNA precursors by using conservation filters as well as structural features of the hairpin and folding energy. We compared these predicted sequences to cloning results from human tissues and cell lines, as well as to sequences of experimentally verified microRNAs in other mammals. In applying similarity considerations we followed Rfam, where more than 45% of the human entries are supported by similarity to microRNAs in other mammals. Table 1 demonstrates the verified predictions. Figure 2A shows the extension of the

cluster of miR-200 to include an additional member that was verified by cloning from human tissues, located approximately 1000 nucleotides downstream to miR-200a (Table 1). Figure 2B demonstrates the identification of two additional microRNA genes in the vicinity of miR-369, one verified by cloning and one supported by its sequence similarity to the mouse homolog (Table 1).

Table 1. Supporting evidence for the predicted microRNA genes in the vicinity of known microRNAs

Predicted microRNA genes supported by cloning

Coordinates of cluster founding microRNAs[1]				Predicted microRNA precursor coordinates		Supporting evidence	
Cluster founding microRNAs	Chromosome[2]	Start	End	Start[3]	end	By cloning (this study)[4]	By similarity[5]
miR-200b, miR-200a	1 (+)	1008542	1009390	1010452	1010518	miR-734-3p	miR-429
miR-191 (MH)	3 (-)	49017063	49017154	49016591	49016681	miR-425-3p,5p	Rfam: hsa-miR-425
miR-127,miR-136	14 (+)	99339357	99341161	99337372	99337503	miR-810	
				99338264	99338356	miR-809	
miR-299,miR-323	14 (+)	99480172	99482195	99483163	99483242	miR-807	
miR-368	14 (+)	99496068	99496133	99497151	99497236	miR-376a-3p	
miR-134	14 (+)	99511065	99511137	99512568	99512647	miR-812	
miR-369	14 (+)	99521976	99522045	99521669	99521773	miR-409-3p,5p	Rfam: mmu-miR-409
miR-144	17 (-)	27334114	27334199	27333954	27334017	miR-806	cand919
miR-224 (MH)	X (-)	149744663	149744743	149745713	149745797	miR-811	

[1] The precursor coordinates are listed. When the predicted miRNA is in the vicinity of an already known miRNA cluster, the coordinates of the whole cluster are listed, from the initial coordinate of the precursor of the first miRNA to the end coordinate of the precursor of the last miRNA.
[2] The chromosome number, strand and coordinates are taken from the UCSC July 2003 human genome assembly build 34 (hg16) (http://genome.ucsc.edu).
[3] The coordinates of predicted miRNAs are on the same chromosome and strand as the known cluster member/s.
[4] Cloned miRNAs were given new names. When miRNAs from both sides of the precursor stem were identified and matched our predictions they are designated with 3p and 5p.
[5] There are three types of supporting evidence by similarity:

What is claimed is:

1. An isolated DNA or RNA molecule comprising at least ten contiguous bases having a sequence in a microRNA shown in SEQ ID NOs:1-94, except that up to thirty percent of the bases may be wobble bases, and up to 10% of the contiguous bases may be non-complementary.

2. An isolated molecule according to claim 1, further comprising a sequence of bases at the 5' end and/or a sequence of bases at the 3' end present in any one of the hairpin precursor sequences shown in SEQ ID NOs: 95-187 or any fragment thereof.

3. An isolated molecule according to claim 2, wherein the hairpin precursor sequence is the sequence in which the microRNA is present.

4. An isolated molecule according to claim 1, wherein the microRNA is incorporated into a vector.

5. An isolated molecule according to claim 1, wherein the isolated molecule is a DNA molecule.

6. An isolated molecule according to claim 1, wherein the isolated molecule is a RNA molecule.

7. An isolated molecule according to claim 1, wherein the isolated molecule further comprises a cap.

8. An isolated molecule according to claim 7, wherein the cap is an inverted nucleotide cap.

9. An isolated molecule according to claim 7, wherein the cap is a chemical cap.

10. An isolated molecule according to claim 1, wherein the isolated molecule consists of any one of the sequences of the microRNA shown in SEQ ID NOs:1-94.

11. An isolated molecule according to claim 1, wherein the isolated molecule consists of any one of the sequences shown in SEQ ID NOs:1-187.

12. A modified single stranded microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone units, each moiety comprising a base bonded to a backbone unit wherein:

at least ten contiguous bases have the same sequence as a contiguous sequence of bases in a microRNA molecule shown in SEQ ID NOs:1-94, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof;

no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units, and

at least one moiety is not an unmodified deoxyribonucleotide moiety or an unmodified ribonucleotide moiety.

13. A molecule according to claim 12, further comprising a sequence of bases at the 5' end and/or a sequence of bases at the 3' end present in any one of the hairpin precursor sequences shown in SEQ ID NOs: 95-187 or any fragment thereof.

14. A molecule according to claim 13, wherein the hairpin precursor sequence is the sequence in which the microRNA is present.

15. A molecule according to claim 12, wherein the molecule is modified for increased nuclease resistance.

16. An isolated single stranded anti-microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone units, each moiety comprising a base bonded to a backbone unit, each base forming a Watson-Crick base pair with a complementary base wherein:

at least ten contiguous bases have a sequence complementary to a contiguous sequence of bases in any one of the microRNA molecules shown in SEQ ID NOs; 1-94, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof;

no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units; and

the molecule is capable of inhibiting microRNP activity.

17. A molecule according to claim 16, wherein the moiety at the position corresponding to position 11 of the microRNA is non-complementary.

18. A molecule according to claim 16, wherein up to 5% of the contiguous moieties may be non-complementary to the contiguous sequence of bases in the microRNA.

19. A molecule according to claim 18, wherein non-complementary moieties are additions, deletions, mismatches, or combinations thereof.

20. A molecule according to claim 16 having any one of the anti- microRNA sequence shown in Table F.

21. A molecule according to claim 16, wherein at least one of the moieties is a modified deoxyribonucleotide moiety.

22. A molecule according to claim 21 wherein the modified deoxyribonucleotide is a phosphorothioate deoxyribonucleotide moiety.

23. A molecule according to claim 21, wherein the modified deoxyribonucleotide is N'3-N'5 phosphoroamidate deoxyribonucleotide moiety.

24. A molecule according to claim 16, wherein at least one of the moieties is a modified ribonucleotide moiety.

25. A molecule according to claim 24, wherein the modified ribonucleotide is substituted at the 2' position.

26. A molecule according to claim 25, wherein the substituent at the 2' position is a C_1 to C_4 alkyl group.

27. A molecule according to claim 26, wherein the alkyl group is methyl.

28. A molecule according to claim 28, wherein the alkyl group is allyl.

29. A molecule according to claim 25, wherein the substituent at the 2' position is a C_1 to C_4 alkoxy - C_1 to C_4 alkyl group.

30. A molecule according to claim 29, wherein the C_1 to C_4 alkoxy - C_1 to C_4 alkyl group is methoxyethyl.

31. A molecule according to claim 24, wherein the modified ribonucleotide has a methylene bridge between the 2'-oxygen atom and the 4'-carbon atom.

32. A molecule according to claim 16, wherein at least one of the moieties is a peptide nucleic acid moiety.

33. A molecule according to claim 16, wherein at least one of the moieties is a 2'-fluororibonucleotide moiety.

34. A molecule according to claim 16, wherein at least one of the moieties is a morpholino phosphoroamidate nucleotide moiety.

35. A molecule according to claim 16, wherein at least one of the moieties is a tricyclo nucleotide moiety.

36. A molecule according to claim 16, wherein at least one of the moieties is a cyclohexene nucleotide moiety.

37. A molecule according to claim 16, wherein the molecule is a chimeric molecule.

38. A molecule according to claim 16, wherein the molecule comprises at least one modified moiety for increased nuclease resistance.

39. A molecule according to claim 38, wherein the nuclease is an exonuclease.

40. A molecule according to claim 39, wherein the molecule comprises at least one modified moiety at the 5' end.

41. A molecule according to claim 39, wherein the molecule comprises at least two modified moieties at the 5' end.

42. A molecule according to claim 39, wherein the molecule comprises at least one modified moiety at the 3' end.

43. A molecule according to claim 39, wherein the molecule comprises at least two modified moieties at the 3' end.

44. A molecule according to claim 39, wherein the molecule comprises at least one modified moiety at the 5' end and at least one modified moiety at the 3'end.

45. A molecule according to claim 39, wherein the molecule comprises at least two modified moieties at the 5' end and at least two modified moieties at the 3'end.

46. A molecule according to claim 39, wherein the molecule comprises a cap at the 5' end, the 3' end, or both ends of the molecule.

47. A molecule according to claim 46, wherein the molecule comprises a chemical cap.

48. A molecule according to claim 46, wherein the molecule comprises an inverted nucleotide cap.

49. A molecule according to claim 16, wherein the nuclease is an endonuclease.

50. A molecule according to claim 49, wherein the molecule comprises at least one modified moiety between the 5' and 3' end.

51. A molecule according to claim 49, wherein the molecule comprises a chemical cap between the 5' end and 3' end.

52. A molecule according to claim 16, wherein all of the moieties are nuclease resistant.

53. A method for inhibiting microRNP activity in a cell, the microRNP comprising a microRNA molecule, the method comprising introducing into the cell a single-stranded anti-microRNA molecule according to claim 16, wherein the anti-microRNA is complementary to the microRNA molecule.

54. A method according to claim 53, the moiety in the anti-microRNA molecule at the position corresponding to position 11 of the microRNA is non-complementary

55. An isolated microRNP comprising an isolated DNA or RNA molecule according to claim 1.

56. An isolated microRNP comprising an isolated single stranded microRNA molecule according to claim 12.

57. An isolated DNA or RNA molecule comprising at least ten contiguous bases having a sequence in a microRNA shown in SEQ. ID. NOs:281-374, except that up to thirty percent of the bases may be wobble bases, and up to 10% of the contiguous bases may be wobble bases, and up to 10% of the contiguous bases may be non-complementary.

58. An isolated DNA or RNA molecule comprising at least ten contiguous bases having a sequence in a microRNA shown in SEQ. ID. NOs:467-481, except that up to thirty percent of the bases may be wobble bases, and up to 10% of the contiguous bases may be wobble bases, and up to 10% of the contiguous bases may be non-complementary.

59. An isolated DNA or RNA molecule comprising at least ten contiguous bases having a sequence in a microRNA shown in SEQ. ID. NOs:497-522, except that up to thirty percent of the bases may be wobble bases, and up to 10% of the contiguous bases may be wobble bases, and up to 10% of the contiguous bases may be non-complementary.

60. An isolated DNA or RNA molecule comprising at least ten contiguous bases having a sequence in a microRNA shown in SEQ. ID. NO:549, except that up to thirty percent of the bases may be wobble bases, and up to 10% of the contiguous bases may be wobble bases, and up to 10% of the contiguous bases may be non-complementary.

61. A modified single stranded microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone unites, each moiety comprising a base bonded to a backbone unit wherein:

at least ten contiguous bases have the same sequence as a contiguous sequence of bases in a microRNA molecule shown in SEQ. ID. NOs: 281-374, except that up to thirty percent of

the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof;

no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units, and

at least one moiety is not an unmodified deoxyribonucleotide moiety or an unmodified ribonucleotide moiety.

62. A modified single stranded microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone unites, each moiety comprising a base bonded to a backbone unit wherein:

at least ten contiguous bases have the same sequence as a contiguous sequence of bases in a microRNA molecule shown in SEQ. ID. NOs:467-481, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof;

no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units, and

at least one moiety is not an unmodified deoxyribonucleotide moiety or an unmodified ribonucleotide moiety.

63. A modified single stranded microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone unites, each moiety comprising a base bonded to a backbone unit wherein:

at least ten contiguous bases have the same sequence as a contiguous sequence of bases in a microRNA molecule shown in SEQ. ID. NOs:497-522, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof;

no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units, and

at least one moiety is not an unmodified deoxyribonucleotide moiety or an unmodified ribonucleotide moiety.

64. A modified single stranded microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone unites, each moiety comprising a base bonded to a backbone unit wherein:

at least ten contiguous bases have the same sequence as a contiguous sequence of bases in a microRNA molecule shown in SEQ. ID. NO:549, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof;

no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units, and

at least one moiety is not an unmodified deoxyribonucleotide moiety or an unmodified ribonucleotide moiety.

65. An isolated single stranded anti-microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone units, each moiety comprising a base bonded to a backbone unit, each base forming a Watson-Crick base pair with a complementary base wherein:

at least ten contiguous bases have a sequence complementary to a contiguous sequence of bases in any one of the microRNA molecules shown in SEQ ID NOs; 281-374, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof;

no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units; and

the molecule is capable of inhibiting microRNP activity.

66. An isolated single stranded anti-microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone units, each moiety comprising a base bonded to a backbone unit, each base forming a Watson-Crick base pair with a complementary base wherein:

at least ten contiguous bases have a sequence complementary to a contiguous sequence of bases in any one of the microRNA molecules shown in SEQ ID NOs; 467-481, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof;

no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units; and

the molecule is capable of inhibiting microRNP activity.

67. An isolated single stranded anti-microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone units, each moiety comprising a base bonded to a backbone unit, each base forming a Watson-Crick base pair with a complementary base wherein:

at least ten contiguous bases have a sequence complementary to a contiguous sequence of bases in any one of the microRNA molecules shown in SEQ ID NOs:497-522, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof;

no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units; and

the molecule is capable of inhibiting microRNP activity.

68. An isolated single stranded anti-microRNA molecule comprising a minimum of ten moieties and a maximum of fifty moieties on a molecular backbone, the molecular backbone comprising backbone units, each moiety comprising a base bonded to a backbone unit, each base forming a Watson-Crick base pair with a complementary base wherein:

at least ten contiguous bases have a sequence complementary to a contiguous sequence of bases in any one of the microRNA molecules shown in SEQ ID NO:549, except that up to thirty percent of the base pairs may be wobble base pairs, and up to 10% of the contiguous bases may be additions, deletions, mismatches, or combinations thereof;

no more than fifty percent of the contiguous moieties contain deoxyribonucleotide backbone units; and

the molecule is capable of inhibiting microRNP activity.

69. A method for inhibiting microRNP activity in a cell, the microRNP comprising a microRNA molecule, the method comprising introducing into the cell a single-stranded anti-microRNA molecule according to claim 65, wherein the anti-microRNA is complementary to the microRNA molecule.

70. A method for inhibiting microRNP activity in a cell, the microRNP comprising a microRNA molecule, the method comprising introducing into the cell a single-stranded anti-microRNA molecule according to claim 66, wherein the anti-microRNA is complementary to the microRNA molecule.

71. A method for inhibiting microRNP activity in a cell, the microRNP comprising a microRNA molecule, the method comprising introducing into the cell a single-stranded anti-microRNA molecule according to claim 67, wherein the anti-microRNA is complementary to the microRNA molecule.

72. A method for inhibiting microRNP activity in a cell, the microRNP comprising a microRNA molecule, the method comprising introducing into the cell a single-stranded anti-microRNA molecule according to claim 68, wherein the anti-microRNA is complementary to the microRNA molecule.

73. An isolated microRNP comprising an isolated DNA or RNA molecule according to claim 57.

74. An isolated microRNP comprising an isolated DNA or RNA molecule according to claim 58.

75. An isolated microRNP comprising an isolated DNA or RNA molecule according to claim 59.

76. An isolated microRNP comprising an isolated DNA or RNA molecule according to claim 60.

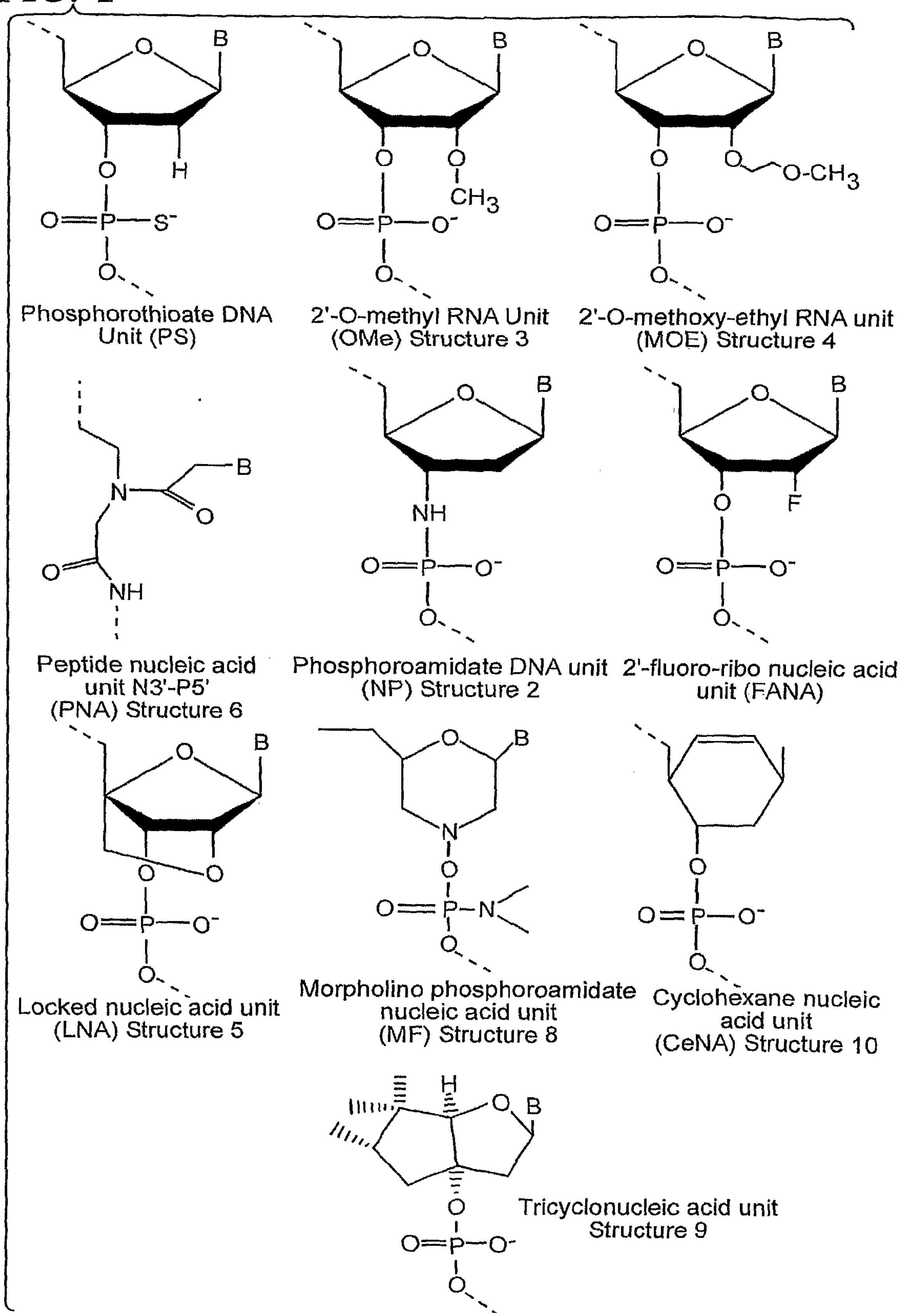
77. An isolated microRNP comprising an isolated single stranded microRNA molecule according to claim 61.

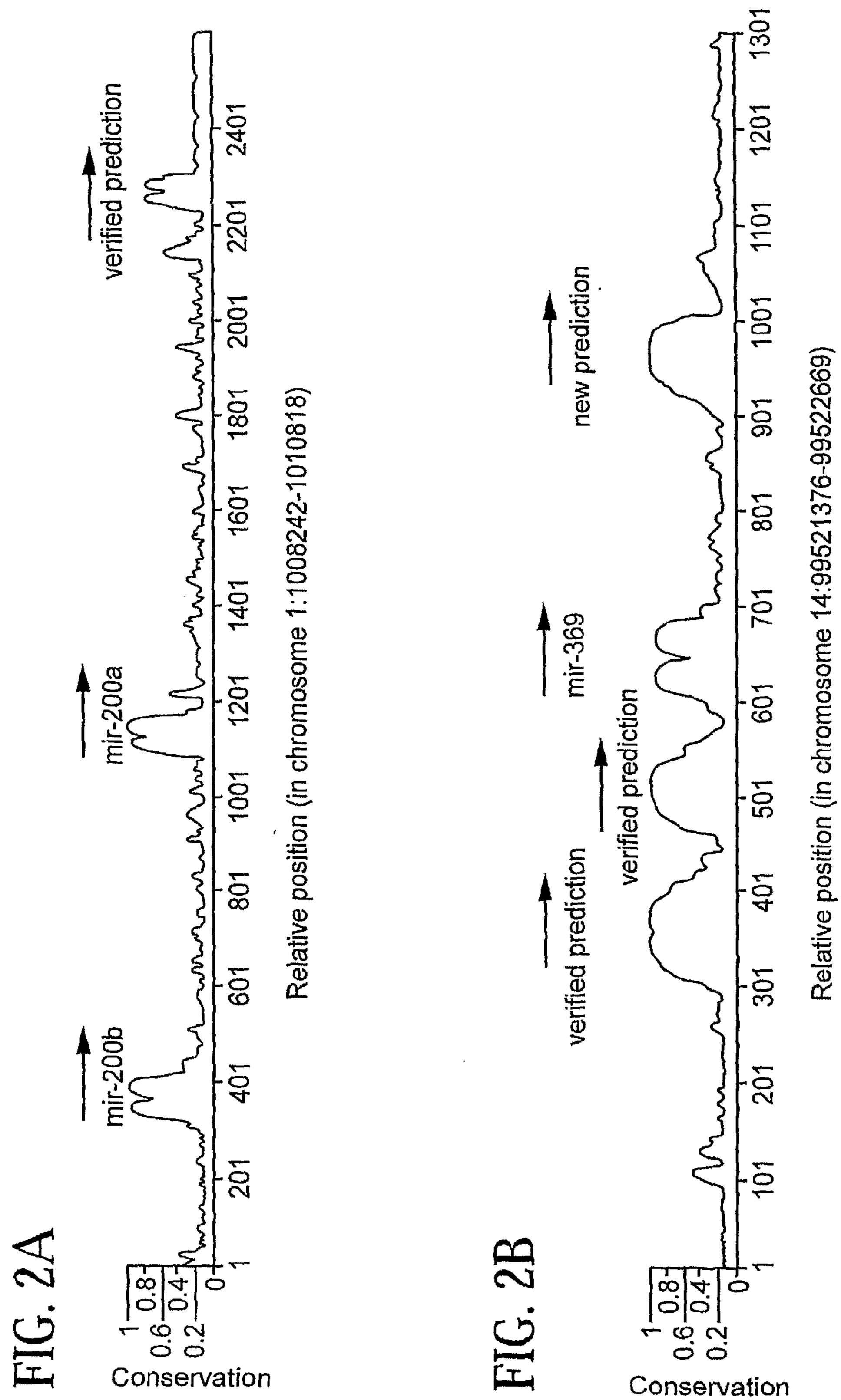
78. An isolated microRNP comprising an isolated single stranded microRNA molecule according to claim 62.

79. An isolated microRNP comprising an isolated single stranded microRNA molecule according to claim 63.

80. An isolated microRNP comprising an isolated single stranded microRNA molecule according to claim 64.

FIG. 1


Phosphorothioate DNA Unit (PS)
2'-O-methyl RNA Unit (OMe) Structure 3
2'-O-methoxy-ethyl RNA unit (MOE) Structure 4
Peptide nucleic acid unit N3'-P5' (PNA) Structure 6
Phosphoroamidate DNA unit (NP) Structure 2
2'-fluoro-ribo nucleic acid unit (FANA)
Locked nucleic acid unit (LNA) Structure 5
Morpholino phosphoroamidate nucleic acid unit (MF) Structure 8
Cyclohexane nucleic acid unit (CeNA) Structure 10
Tricyclonucleic acid unit Structure 9


Conservation
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0.6
0.4
0.2
0
mir-200b
mir-200a
verified prediction
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201
401
601
801
1001
1201
1401
1601
1801
2001
2201
2401
Relative position (in chromosome 1:1008242-1010818)
Conservation
verified prediction
verified prediction
mir-369
new prediction
1
101
201
301
401
501
601
701
801
901
1001
1101
1201
1301
Relative position (in chromosome 14:99521376-99522669)

FIG. 2A

FIG. 2B